

FEB. 4, 1915

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MOTOR AGE

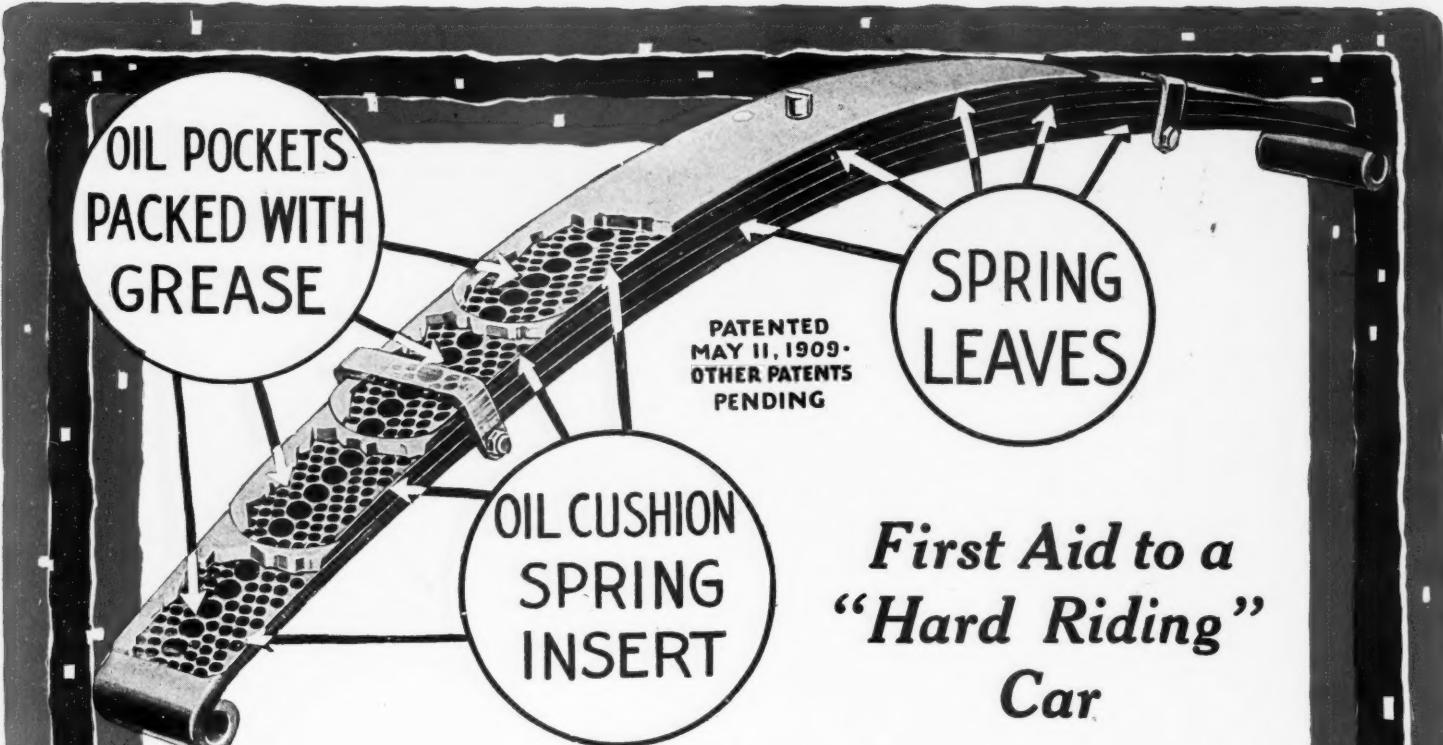
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Trade Advice:

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THE ROYAL EQUIPMENT COMPANY
1354 BOSTWICK AVENUE :: :: BRIDGEPORT, CONNECTICUT

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* * *

THREE is no known Cure for CANCER—
except the *Knife!*

With it, even the kindest and friendliest of Surgeons *must* hurt the Patient's feelings somewhat, if he would restore his Health or Save his Life.

Just such a painful and unpleasant Duty is ours to perform to-day.

A Cancerous growth has, for years, been insidiously eating into the Vitals of the Tire Industry.

It now threatens to destroy the future of the legitimate Tire Retailer's business, by diverting his Trade to the "Price-Cutting Specialists" and to Consumers' Supply Departments.

That "Cancer" is the PADDED Price-List, and the exorbitant profits that it promises to Retailers, but *can never deliver* so long as business is conducted on modern and reasonable principles.

We propose to *amputate* the PADDED Price-List, and what it stands for, off the Tire-Industry.

* * *

Goodrich Fair-List Prices

SIZE	PLAIN TREAD	SIZE	SAFETY TREAD
30x3	\$9.00	30x3	\$9.45
30x3½	11.60	30x3½	12.20
32x3½	13.35	32x3½	14.00
33x4	19.05	33x4	20.00
34x4	19.40	34x4	20.35
36x4½	27.35	36x4½	28.70
37x5	32.30	37x5	33.90
38x5½	43.80	38x5½	46.00

WE propose to do this, firstly by our own Example, in issuing our Price-Lists at the *par* figures which will give *Consumers* full Value for their Money, a *moderate* profit for ourselves, and a *fair* NORMAL profit for the Dealer, which he can actually GET.

Secondly, by initiating a Campaign of frank, fair, and fearless *Publicity*, showing the true *Inwardness* of what the *Padded* Price-List stands for.

We do this in self-defense of *our own future*, as Tire Manufacturers.

We do it also, and more *immediately*, to save the Tire-Retailer from the self-destruction with which the *Padded* Price-List CUSTOM now threatens him.

Tire-Retailers (as well as Consumers) everywhere, are invited to write to us for full particulars of what we are *going* to do, *are* doing, and *will continue* to do, toward *putting "down"* the *Padded Price-List* and ensuring the Retailer the enjoyment of his legitimate Market.

Tire Manufacturers who desire to quietly sell their Product through *other* Sources than the *legitimate Dealer* will doubtless oppose this Campaign desperately, and do all in their power to stultify "the Surgical Operation."

That is why we ask *Tire Retailers* and *Consumers* to promptly *investigate* the Conditions our publicity will boldly define, and to throw the weight of their Influence and Patronage on *that* side of the Fight which they consider *RIGHT*, Fair and for their own best interests.

* * *

HERE is the "GOODRICH-STANDARD" Price-List to Consumers!

Made to sell Tires from,—not made to merely QUOTE DISCOUNTS OFF.

Bearing a *moderate* Manufacturers' profit for ourselves, and a Retail Profit for the Dealer which is not only *Fair*, *ample* and *Normal* but *LARGER* than he has actually averaged on all other Makes of Tires, when the fierce Price-Cutting that the *Padded* Price-List System is responsible for, has had its effect.

GOODRICH —

THE B. F. GOODRICH CO.
Akron, O.

FAIR-LISTED TIRES



MOTOR AGE

Published by the
CLASS JOURNAL COMPANY
910 South Michigan Avenue
CHICAGO ILLINOIS



YEARLY SUBSCRIPTION RATES

United States, Mexico and U. S. Possessions.....	\$3.00
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In forwarding change of address, please give old and new address.

BEWARE OF SOLICITORS, OFFERING SUBSCRIPTIONS AT CUT RATES.

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February 4, 1915

No. 5

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A feature in the next issue of Motor Age will be an article describing the American hospital in France, entitled "Yankee Motor Service Makes American Hospital a Red Cross Triumph." The author, W. F. Bradley, has studied the system thoroughly and describes it in his usual clear and concise style.

Why right *after* the shows is an exceptionally good time to advertise

Automobile Shows stimulate interest in motor cars and accessories *tremendously*. Enthusiasm is brought to a high pitch. New desires have just been formed. New cars, new equipment are at this time more the talk than ever.

Tens of thousands have been put in the buying mood. Tens of thousands are undecided whether it is to be your product they will purchase or that of your competitor.

To neglect *following up* the Shows—the especially timely advantages they afford—is to waste one of the big advertising opportunities of the year.

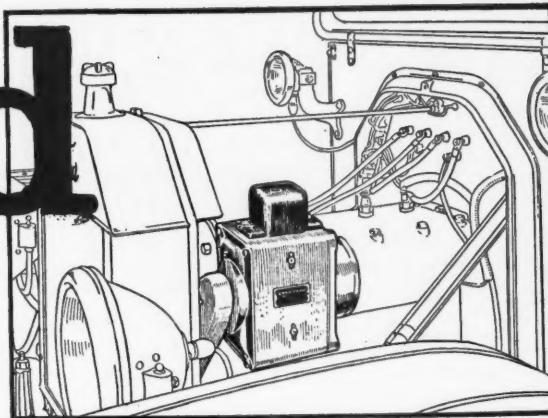
Furthermore, consider that car owners are now planning their spring purchases. MOTOR AGE—"The Motoring Authority of America"—is their reference book.

Last week's MOTOR AGE news-stand circulation—an unfailing barometer of interest in motoring affairs—reached the highest point in its history. Circulation up—advertising rates the same. You get the advantage of the overflowing measure.

Rate Card
sent on request

Motor Age
910 S. Michigan Ave. Chicago

Ford



Automobile Supply Dealers visiting the New York and Chicago Automobile Shows signed contracts for so many thousand Gray & Davis Starting-Lighting Systems for Ford Cars that we hesitate to state the actual number lest it seem untrue.

This endorsement of a system which was announced to the public but a few weeks previous proves the confidence placed in Gray & Davis by the men best qualified to judge our equipment in comparison with others.

While we will produce 100,000 Ford Starting-Lighting Systems during 1915, it is doubtful if this quantity will prove sufficient.

Can be installed on any new or used Model "T"

\$**75**
Price complete
F.O.B. Boston

See also the special Ford headlights listed at \$5 a pair

GRAY & DAVIS, Inc., Boston

GRAY & DAVIS STARTING - LIGHTING SYSTEM



MOTOR AGE

Just Before Armageddon A Record of a Pre-War Tour in Belgium

By Gordon W. Hayter

Readers of *MOTOR AGE* who have followed the interesting articles on the European war as it pertains to motoring, written by W. F. Bradley, will find in Gordon W. Hayter's "Just Before Armageddon" something of additional interest in that Mr. Hayter describes Belgium as the motorist saw it just before war broke out. At the present time Mr. Hayter is a lieutenant in the Mechanical Transport section of the British Army service corps and now is in active service somewhere in France. Mr. Hayter's article is illustrated with photographs taken by himself. The illustration on this page shows La Roche.

FOR my introduction to Belgium, and for the motor tour that I subsequently completed in that most distressful country, I am indebted to the Institution of Automobile Engineers. As an associate member of that body, I took part in its annual tour of factories, which, in 1914, happened to have been arranged in Belgium. Believing in the value of embracing opportunities, I decided that, at the end of the semi-business trip, I would extend my knowledge of King Albert's country by motoring through the beautiful Ardennes forests.

Accordingly, the boat that took the members of the I. A. E. party across from Har-

wich to Antwerp carried a small two-seated cyclecar. The cyclecar is introduced into the narrative, not because it played a very important part in the tour, but because it gave its owner an opportunity of discovering how real is the freemasonry of the road the whole world over.

Arrived at Antwerp, I saw to the safe unloading of the cyclecar. Here let me comment on the great care taken, both at Harwich and Antwerp, in the loading and disembarkation of cars. The cyclecar received not so much as a scratch, and soon it was safely housed in the Rue de Jésus garage, where it was to stay for a week while the tour was in progress.

To deal with the I. A. E. tour is foreign to the purpose of this article, but in justice to the hospitable Belgians I cannot refrain from remarking upon their determination, wherever we went, to cement firmly the motoring fraternity. We were welcomed at the various works—some, alas, now in ruins—as kindred souls with common aims, hopes and ambitions. One other impression retained is of the amazing cleanliness of the manufacturing centers. Liège, for example, reminded me more of an English country town than of one of Europe's principal centers for the mining and iron industries. The populace has a natural artistic temperament, shown in the town's



A BIRD'S-EYE VIEW OF THE CITY OF ANTWERP FROM THE CATHEDRAL TOWER

fine hotels and shops, while well-kept green open spaces, with perhaps a centrally-arranged statue by one of Belgium's famous sculptors, made the whole town pleasing to the eye.

Just a week after our arrival at Antwerp, we were once again on the quay, whence, having said good-bye to my friends, I returned to my hotel to make arrangements for the tour that was to begin a couple of days later. One day I devoted to doing Antwerp in the approved style. The problem was where to start, and what to miss, for it needed a week to see everything.

Antwerp's Marvelous Cathedral

Right opposite to my window in the Hôtel St. Antoine and across the Place Verte—lately a dumping-ground for German 42 centimeter siege-gun shells—towered into the heavens the 402-foot cathedral spire. Having paid my franc, I entered and duly admired the architecture, the Rubens paintings and the life-like carvings. Being myself a phlegmatic Englishman devoid of any artistic sense, I have to admit that the cathedral impressed me more as a masterpiece in engineering than as a treasury of art. The fact that, in 1352, Jean Amel, of Boulogne, who could have had but few of the aids to building that exist in modern times, should have had the boldness to contemplate such a building struck me as marvelous. It sets one thinking seriously whether the sci-

ences have really advanced during the last five and a half centuries to the extent that we are told they have.

A Climb Worth the Effort

With this problem in my mind, I expended a further 50 centimes and much toil in climbing to the top of the cathedral tower. There are 616 steps to be conquered to reach the topmost gallery; I never regretted less the devotion of so much energy, for the panoramic view is superb. To the northwest is the Scheldt, threading its winding course to the North sea through Holland. The miles and miles of quays showed Antwerp's importance in the maritime world. That it was at one time the most wealthy and prosperous city on the continent accounts for its architectural grandeur. Its present condition in

the hands of an enemy it has endured many times before; in fact, Belgium has aptly been described as the "cockpit of Europe." With little thought then of what providence was holding in store for Antwerp, I spent a most delightful day sight-seeing, the description of which would absorb too much space.

Off to a Bad Start

Early on the morning following my tour of Antwerp I repaired to the garage in the Rue de Jésus, and I was soon off to the open country. The pavé was awful. In some places the road surface contained holes big enough to bury a horse. Bravely the little cyclecar battled with conditions that it never had met in its native land, while every moment its owner expected to hear the ominous crack of a spring.

The guide-books tell one that the roads in northern Belgium are bad, but I expected nothing like that which I was enduring. Tools rattled, lamps fell off, luggage came adrift, and I should not have been the least surprised if the little car had fallen in half, out of sheer spite for being driven over such roads. After about 6 miles, the road improved, the top gear was slipped in, and merrily we bounded forward with the past but a nightmare. Unfortunately, just as we were beginning to feel the *joie de vivre*, experienced by rapid motion through the air on a glorious July day, an invisible force applied a brake, and, in less time than it



LA ROCHE FROM THE CASTLE



THE RIVER SCHELDT, PHOTOGRAPHED FROM TOWER OF ANTWERP CATHEDRAL. WHEN THE CITY FELL INTO THE HANDS OF THE GERMANS THE ALLIES RETREATED OVER A PONTOON BRIDGE AT THIS POINT

takes to record, the cyclecar had stopped right in the middle of the road, immovable—the gear-box shaft had seized.

Hastily I examined the damaged parts and was brought face to face with the fact that there would be no Belgian tour with this particular vehicle. Dejected, I hailed a passing taxi-cab and, of course, three or four stopped, leaving me to decide which should have the honor of towing me back to Antwerp. I chose the one whose driver had the most honest appearance, and how good my judgment proved may be gathered from the fact that, having let him out of my sight for about 2 minutes, when once again back at the Rue de Jésus garage, I discovered him busily engaged dexterously revolving, with the aid of a hatpin, the indicator disc of the taximeter. I paid at the rate of about \$1 a mile for the privilege of being towed by this gentleman whose honest face had attracted me. Argument was useless; by the Belgian law one must pay, and afterwards sue. Ere this he probably has paid the penalty of possessing such a useful knowledge of how to use a hatpin to its best advantage, and if the few extra francs he made out of me has helped him to escape from his unfortunate city, good luck to him.

I was able now to consider at leisure the awkward situation in which I found myself. The garage proprietor told me that it would take 3 or 4 days to put the gearbox in order, and, having some knowledge of the motor industry, I translated 4 days into a week. Obviously I could not hang about another week in Antwerp.

It appeared as if all I should learn of Belgium would be from a railway-carriage window. Such a thought was unbearable.

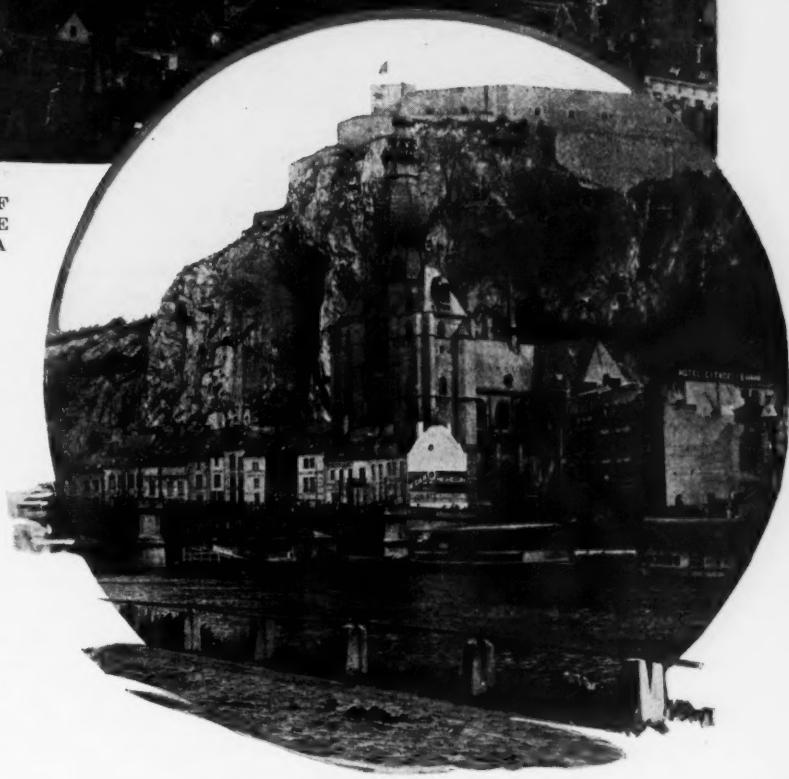
Gradually an idea formed itself in my mind. Certainly it was bold, but then no worse could be my fate than that of being refused. I would go to Chef Directeur de Jong, of the Minerva factory in Antwerp, tell him my pitiful story, and ask him for the loan of a Mi-

nerva. To cut a long story short, M. de Jong was the essence of generosity, and in less than 4 hours after my request I was packing my belongings into a brand new 18-horsepower Minerva, with two-seated body and enough spare wheels, tires and tools for a tour half round the world.

Towns Made Famous by War

To return to July 20, the day on which I began my tour of Belgium. I must have been one of the last English tourists to see such towns as Malines, Louvain, Tirlemont, Dinant, etc., before they assumed world-wide importance in the history of the war. Leaving Antwerp by the same route as on the day previous, the well-sprung Minerva quickly negotiated the bad stretches that had, I feel convinced, broken my little cyclecar's heart, and soon the cathedral tower of St. Rumbold at Malines came into view. The country here is flat

BRIDGE AND CITADEL AT DINANT



and uninteresting; the roads are of paving with indifferent, bad, and execrable surfaces. Malines, in times of peace, is a typical market-town, generally full of people from the surrounding country who come to sell farm produce. The conveyances employed are extraordinary. In the case of horse-drawn vehicles, the animal is placed at the head of the pole instead of alongside it. What is more extraordinary still is that the driver is provided with but one rein. How he manages to guide his horse I never discovered, nor can I fathom the rhyme or reason in placing the horse so far ahead of the vehicle. The dog-drawn cart is the most popular means of transport, and the loads these animals are capable of pulling is remarkable.

In Malines I paused to take a photograph of the cathedral, which has suffered rather badly from shell-fire, but, not pos-



LA ROCHE A' BAYARD AT DINANT, SO CALLED AFTER HORSE OF THAT NAME BELONGING TO ONE OF THE QUATRE FILS D'Aymore, WHICH IS SUPPOSED TO HAVE LEFT A HOOF MARK IN SPRINGING ACROSS THE VALLEY WHEN PURSUED BY CHARLMAGNE. THE SMALLER ILLUSTRATION ALSO IS A SCENE AT THIS PLACE

sessing rich external carving, is not permanently disfigured. For Brussels one leaves by the gate of that name and about $4\frac{1}{2}$ miles out of Malines the road changes from pavé to beautiful macadam. Brussels has been aptly described as a pocket edition of Paris. My preference, shared with many others who know both cities well, is for Brussels as against the French capital.

Waterloo and Its Beggars

At this point I should perhaps explain that the objective of this motor tour was Dinant and the Meuse valley. The direct road lay through Wavre, but the field of Waterloo tempted me to make a detour. To reach the battlefield, where 100 years ago the French met half the rest of Europe to settle a difference of opinion, one leaves Brussels by way of the Bois de la Cambre. A half natural and-half artificial park, the Bois de la Cambre, is unequalled, and it is well worth the few extra kilometers involved in passing through it instead of taking the more direct route. The field of Waterloo is about $9\frac{1}{2}$ miles from Brussels, and the traveler is notified of its proximity by seeing on the right-hand side of the road a 28-ton lion crowning a mound thrown up on the spot where the Prince of Orange was wounded. The lion was cast at John Cokerill's works at Seraing, near Liège, from the metal of captured French cannon.

Like so many other show places on the continent, the field of Waterloo is the happy hunting ground of beggars suffering from every imaginable disease, peddlers of spurious relics, and guides whose praise for the valor of the British army of June 18, 1815, is in direct proportion to the tip they expect. So persistent are these loiterers that one has to nip their unwelcome attentions in the bud, or bear the consequences of being followed and worried the whole time. Lining the main

road are statues to commemorate the men of different nations who fell in the battle.

Although we did not visit nearly all the places of historic interest at Waterloo, the afternoon was far advanced before we were once again on the road. No sooner was the Minerva getting well into its stride along the straight flat roads, now happily of good surface, than a terrific thunderstorm burst. With the roaring of the thunder, the vivid flashes of lightning that darted across the black sky, and the driving rain, one could almost imagine that one was taking part in a second Waterloo. Although the car had no hood or windshield, I dared not stop in that elm-lined road, and the only thing to do was to go all-out, steering as straight a course as plain tires would permit on the slippery road surface and hoping to get outside the storm area. In this we were disappointed, for it was still raining in torrents when a sudden turn in the road brought

into view Namur bathed in mist. The road from Quatre Bras runs along high ground, so that the first we saw of Namur low down on the banks of the Meuse was the roofs of its houses, and the last mile is all down hill. After several close shaves with street cars, which completely monopolize most Belgian towns, we crossed the river en route for Dinant.

Driving Along the Meuse

As far as Namur the countryside is not such as to cause one to become enthusiastic, but immediately we began to leave the smoke and fog behind us, the surroundings entirely changed. The road to Dinant runs alongside the Meuse valley, only separated from the river, here 200 feet wide, by a single iron rail resting on conical stone supports. On the opposite side of

the road to the river is the railway, and then a steep, well-wooded cliff, in places 300 feet high. The opposite side of the river is similar. Here and there a waterfall adds to the piquancy of the scene, which in the slanting rays of light from the evening sun, that now had succeeded in dispelling the black clouds, assumed a coloring of unparalleled beauty. There was insufficient light for photographing, and I intended returning the next day

from Dinant for that purpose, but, alas, "the best laid schemes gang aft agley," and I did not return, other scenes occupying my attention.

By the time Dinant was reached it was almost dark, and, although the distance covered had not been excessive, the pouring rain had made me quite ready for a good meal and the

comfort of an hotel. Slowing down soon after entering the town I began to look in my Baedecker for a list of hotels. Evidently I was following the system of hundreds of other tourists, for it was a sign for several hotel-touts to fly at me pell-mell; before the appearance of the Baedecker, they gave no indication of their mode of livelihood. Finally we were led away to the Hôtel du Nord, by its exceptionally able representative, who appeared to be reasonably truthful about his hotel's virtues, except in neglecting to state that it faced the station shunting yard that worked all night to the accompaniment of fierce blares of a form of horn, which, at the mouth of a lusty-lunged official, gave forth such noises as come from a lost soul in a state of great agitation.

A Tour of Many Tortures

Eventually morning came, and, after petit déjeuner, the exploration of the old town of Dinant began. Thanks to the Meuse and its picturesque valley, Dinant has developed on the lines of a seaside resort, and during the season is full of visitors. During the thirteenth, fourteenth and fifteenth centuries Dinant was famous for its chased copper work. It has ever been a sufferer at the hands of the invader; in the fifteenth century, 800 of the inhabitants were tied back-to-back by Phillip le Bon and thrown into the Meuse in expiation of some slight act of courtesy. The citadel long since has ceased to be of any military importance, and now is devoted to housing implements of torture peculiar to the "good" old days.

In less than a month after I was there the church of Notre Dame—thirteenth cen-



tury Gothic—lost the dome of its spire, as the result of a well-placed German shell, while the bridge across the river is now nothing but a heap of ruins. The height of the limestone cliffs at this point may be judged from that of the church spire, which is over 200 feet. Without seeing anything in particular, but much in general, one can spend quite an interesting day in the town. As a center for an Ardennes tour, Dinant provides the visitor with a continuous parade of motor cars of all makes and of every country.

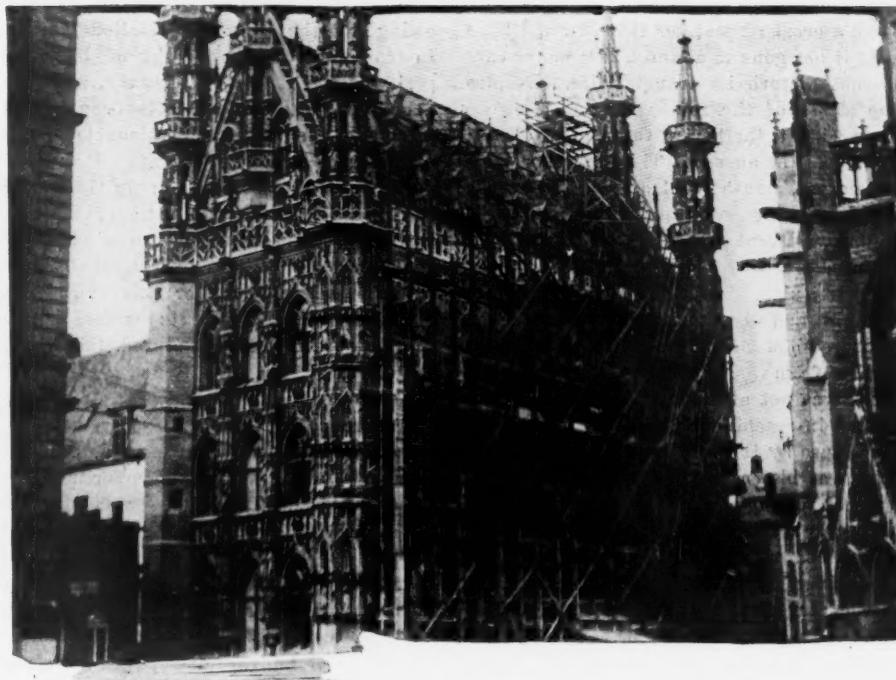
From Dinant we proceeded along the left bank of the Meuse en route to Waulsort. The railway again is on one side of the road and the river on the other. The scenery is superb. The jagged and irregular line of the limestone cliffs, in places thickly wooded and elsewhere standing out gaunt and clear against the sky-line, presents to the eye of the traveler a picture of great beauty and variety. Waulsort is situated at the base of the cliffs on the left bank of the Meuse and its principal attraction is its serenity. Not far distant along the Meuse is Givet, around which town heavy fighting took place in the early part of the war. As it was just over the French frontier, Givet could not be visited.

After two nights in Waulsort, we made for Rochefort. To strike the main road for that place it is best to return to Dinant and cross the river there. Beforehand we made a short excursion to the Chateau Walzin, about 5 miles from Dinant, along the picturesque valley of the Lesse, a tributary of the Meuse. The scenery along the banks is similar to that of the Meuse, but on a smaller scale.

A Chateau of Long Ago

Chateau Walzin we found to be a thirteenth century building standing on the very edge of a precipitous cliff. The swift flowing stream had so worn away the base of the cliff as to make the chateau as a place of residence appear absolutely dangerous. To reach Walzin one passes along the right bank of the Meuse. In the distance one sees a piece of cliff jutting out to the water's edge and apparently blocking the roadway. Closer investigation reveals that the projecting cliff has been tunneled—some say by Napoleon on his way to Waterloo—and there was ample room for the Minerva to pass through. This particular piece of road is known as the Roche à Bayard, so called after the horse of that name belonging to one of the Quatre Fils d'Aymore, which is supposed to have left a hoof mark in springing across the valley when pursued by Charlemagne.

For several miles out of Dinant the road is ascending continually and is in the nature of a cutting, bounded on both sides by steep, well-



THE HOTEL DE VILLE AT LOUVAIN, SO OFTEN MENTIONED IN THE WAR DISPATCHES

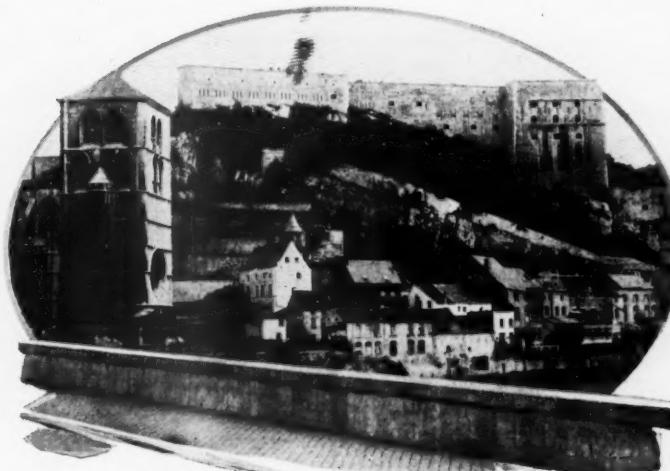
wooded cliffs. Once out of the valley and on the high ground the view is magnificent. One can see for miles and miles the cultivated fields with their dividing hedges resembling a huge patchwork quilt in which, unlike some quilts, the colors blend in perfect harmony. When we left Dinant we had an idea of staying the night at Rochefort, but after a cup of tea and a look around the town we decided to move on. The great attraction of Rochefort is the grottoes of Han and to a lesser extent its own grotto. We went on, however, to Marche. The road from Rochefort to Marche is as boresome as the road to Rochefort had been interesting; moreover, Marche, on being reached about 5 o'clock, proved no more attractive than Rochefort as a halting-place for the night. Its one hotel was not inviting. If it had been at all possible, Marche would have secured our custom easily, for the atmosphere had grown much colder and there were signs of

a coming storm. After consulting the map, we decided to make for La Roche, about 22 miles distant.

La Roche Cradled in Hills

As far as Hoton the scenery was poor, but at that village one enters the gorgeous valley of the Ourthe. On both sides of the river which winds among the hills there are steep cliffs. The road is half-way up the left bank, many feet above the river, so that the traveler has an ever-changing panoramic view of mountain, wood and stream. Just before La Roche, the valley opens out into a huge basin, which the road skirts, and the town is entered by way of a deep narrow cutting in the walls of the basin. La Roche itself is completely surrounded by hills, except for two narrow gaps for the passage of the river, which, by a huge bend, makes the town almost an island. In the middle of the town rises what must have been once a well-fortified castle. The grandeur of the surrounding country in the fast-failing light was awe-inspiring.

On the next day a visit was paid to the castle ruins, where a most amicable guide delivered a long ovation in a French patois that made him difficult to understand. We spent a pleasant day cruising around the town on the Minerva and on the following day we shaped our course toward Antwerp. That afternoon, in a blinding storm, I was responsible for the one fatality of the tour. A hen that by its appearance had reached an age of discretion and should have known better, tried conclusions with the two



THE FORT AT HUY, SHOWING CITADEL PERCHED HIGH UP ON RIGHT BANK OF RIVER MEUSE

near side wheels and came off second best. I have a great respect for that hen and hope that it has gone to a land where motor cars do not disturb its tranquil life. Despite the stress of the few moments following the accident, the hen, with an inborn sense of duty, laid an egg. This, together with the corpse, was handed over to its owner, and we were soon on our way again, seeking new adventures.

From Marche onwards the scenery was not particularly beautiful. The roads were straight and lined with trees planted at measured distances. The countryside, while fertile from an agriculturist's point of view, was not attractive, and no time was wasted in reaching Huy. Here we crossed the Meuse by the very bridge that 3 weeks later was blown up by the Belgians to delay the crossing of the German forces. The photograph from which the illustration is reproduced was taken from a parapet of the bridge itself, and shows the citadel perched high up on the right bank of the river. Just around Huy the scenery improves, but a few miles out settles down again to the style of country typical of North Flanders. On the whole, the roads are good, and one can indulge in a little speed if so be the inclination.

After Huy the next town of importance was Tirlemont, now a mass of charred ruins, and by 5 o'clock Louvain came into view. Tea was nicely served at the Hôtel Suéde, and as the hotel appeared clean and comfortable it gave us hospitality for the night. Many of the Louvain streets down which we walked during an after-dinner

stroll must be now almost impassable, owing to the debris of fallen houses. Louvain was at the height of its prosperity in the fourteenth century, when its population was 150,000. Its decline was primarily due to the objectionable habits of the weavers who constituted a large portion of the population; in 1378, for example, thirteen magistrates of a noble family were thrown from the windows of the Hôtel de Ville and caught by the populace on spears. For this ungracious act the weavers had to suffer: Duke Wenceslaus, in 1382, captured the place, and the guilty inhabitants fled to England. The university was founded in 1426, and the church of St. Pierre, destroyed in the present war, was begun in 1423. The present Hôtel de Ville, which, fortunately, is spared, is a beautiful example of late Gothic architecture and was erected during the period from 1447 to 1463.

Of the journey from Louvain to Antwerp there is little to record, the country being flat and uninteresting. About 20 kilometers out of Louvain one strikes the main Brussels road at Malines.

In view of the present political situation, to recommend touring in Belgium may seem out of place, but the country has wonderful recuperative powers, and when the war is over it will be claiming touring motorists again. To such I give the advice to see that the car is fitted with a really powerful horn; the farmers' heavy carts, with their iron-tired wheels, make such a noise over the pavé that the ordinary bulb horn is quite inaudible.

servative motorist and the Wawona highway gives the Big Tree scenery for the sight-seekers.

RECIPROCITY LAW DECISION

Camden, N. J., Feb. 1—Judge Boyle has filed an opinion in the appeal of Cyril Lever, of Philadelphia, from the judgment of Justice Jackson on a complaint charging Lever with driving a car in New Jersey without a license, dismissing the petition to have the verdict set aside, but reducing the fine imposed from \$350 to \$25. The issue involved the reciprocity law. Lever was arrested in 1913 and subsequently fined for driving a car owned by his father and registered in Pennsylvania. The Pennsylvania law at that time not requiring a driver's license, neither father nor son had one, and it was argued that under a literal construction of Jersey's reciprocity regulations the license was not required.

NEW YORK SHOWS MOTOR GROWTH

New York, Jan. 29—Twenty-five per cent more licenses were taken out in this state in 1914 than in the previous 12 months, according to official figures given out by Secretary of State F. M. Hugo. There were 169,966 registrations in 1914, as compared with 134,405 in 1913; the comparative receipts \$1,529,852 and \$1,275,727, an increase of \$254,125.

The owners numbered 169,966 in 1914 as compared with 134,405 and the chauffeurs numbered 66,636 with 56,702 in 1913. The registration figures show that 54,234 cars were registered in Greater New York, 31,384 of which were credited to Manhattan. New York city's increase over 1913 was 7,964, or about 20 per cent, as compared with the gain in the state at large, which may be accounted for by the fact that the country districts are the larger purchasers of cheap cars.

TRANSPORTATION LINES AROUSED

New York, Jan. 20—In a report by George Keegan and F. T. Wood, assistants to Theodore P. Shonts, president of the Interboro and New York Railways Co., operating surface, subway and elevated lines in the metropolis, motor buses were condemned. This report was made after study of European conditions, and is a frantic effort on the part of traction interests to prevent the city granting additional franchises. It is alleged in this report that motor buses cause more accidents than street cars and increase street traffic congestion. It is also frankly stated that motor bus competition would cut into the profits of the traction companies.

ANOTHER INDIANAPOLIS ENTRY

Indianapolis, Ind., Feb. 2—W. W. Brown, a Kansas City sportsman, has entered a car of his own design in the next Indianapolis 500-mile race, raising the total nominations for that event to eight. Though not famous nationally, Brown has considerable local reputation.

New Tire Prices Favor the Consumer Prominent Makers Announce Reductions

CHICAGO, Feb. 3—Reduction in the prices of tire casings are being announced by the leading tire makers. It is not a price-cutting war, it is said, but an effort on the part of the manufacturers to protect the consumer from so-called middlemen who slash prices so that the consumer hardly knows which way to turn when making purchases.

In nearly every case the reduction has been made to the consumer and in several instances the dealer has had his margin reduced. A week or so ago Republic dropped from 10 to 12 per cent on its casings only, a reduction that is shown, for instance, in the 34 by 4, which used to sell at \$31.40 but which now sells for \$28.25.

The latter part of last week the Goodrich company came out with a new list which is said to be approximately 20 per cent lower than it used to be. The popular size, 34 by 4, now lists at \$19.40 for the plain tread, as against the old price of \$24.35.

It is said that Goodyear has dropped so that now it is about 15 per cent lower on its plain treads, while its non-skids are

about 17 per cent higher than its plain treads.

Firestone, while not announcing any definite schedule, says that its prices will be in keeping with the market price of crude rubber, and it, too, is expected to meet the competition of the others. Fisk also will do likewise, it is said.

YOSEMITE NOT OPEN UNTIL MAY

Los Angeles, Cal., Jan. 27—The Yosemite will not be open to motorists until May, according to Senator Davis A. Curry who now is in this city after a trip into the valley with an educational motion picture concern.

The snowfall has been so heavy this season that it will lock the national park until May and it will not be practical for motorists to try to make the run into the valley before that time.

Senator Curry says that there will be three routes into the valley open to motorists in 1915, giving a great variety of scenery. The Coulterville road, the first opened, will attract the motorist who wants rough mountain going. The Big Oak Flats route offers an easy road for the more con-

Kardo's Case Against Reo Agent In Court's Hands

Testimony Heard in Patent Suit Brought in Cleveland

CLEVELAND, O., Feb. 2.—That the Reo Motor Car Co., in adopting in its bevel-gear driving a compensating mechanism termed a floating spider, infringed on patent No. 792,690, issued to Alanson P. Brush, of Detroit, is the allegation of the Kardo Co., substituting for the American Ball Bearing Co. in action against Henry J. Adams, former representative of the Reo factory and dealing locally as the Reo Motor Sales Co.

Judge John H. Clarke heard testimony and arguments of the attorneys, opening the case last Friday. This final hearing follows that of the American Ball Bearing Co. against Edward B. Finsh, representing the Chalmers Motor Co. In the Chalmers case Judge Clarke will be unable to render an opinion for a week or 10 days. He has found it necessary to review the legal citations and study the history of the case.

Direct evidence was heard in the Reo case Friday and Saturday and rebuttal testimony was given Monday and Tuesday. Witnesses Monday were Charles E. Duryea, H. T. Thomas, chief engineer of the Reo company; Walter C. Baker, Fred C. Dorn, treasurer of the American Ball Bearing Co.; Phillip Dorn, with the American Ball Bearing Co., and Donald C. Carpenter, professor of mechanical arts in Cornell university.

The Kardo company fell heir to the suit against the Reo representative when it took over the patents of the American Ball Bearing Co. The bill of complaint was filed June 25, 1913, and the case was transferred to the Kardo company October 3, 1914.

The mechanism in question has to do with light, quiet running operation of a motor car and the complaint alleges the compensating gear arrangement is the same as that to which Mr. Brush received patent and assigned to the American Ball Bearing Co. Prior art testimony was introduced by the defense.

The interest the National Automobile Chamber of Commerce has taken in the two cases on hand in its support of the defense gives rise to the belief, in the minds of attorneys representing each side, that Judge Clarke will require an explanation of the organization and aims of the chamber.

The Kardo Co. is represented by Edward Rector, of Rector-Hibben-Davis-Macalley, Chicago, and Edward R. Alexander, of Cleveland. Attorneys for the defense are R. A. Parker, Detroit and F. P. Fish, Boston. Among motor car representatives present during the trial of the Reo case were C. E. Tibbetts, of the Packard company and Mr. Brannigan, of the Automobile Chamber of Commerce, in addition to the officials who testified.

Judge Clarke expects to close the Reo case Wednesday or Thursday and it will be 2 weeks before he can render an opinion, it is believed.

DECISION AGAINST THE DODGES

Washington, D. C., Feb. 1—Special telegram—The district court of appeals today affirmed the action of the supreme court of the District of Columbia in denying an injunction to Dodge Bros., Detroit, who sought to enjoin the commissioner of internal revenue from collecting a surtax levied against the motorcar manufacturers under the income tax law.

The plaintiffs declared that their taxable income exceeded \$780,000 each and that the normal tax under the law was \$14,174.72 and that a surtax of \$65,148.36 was to be collected in addition. The plaintiffs urged irreparable injury if compelled to pay the surtax.

Counsel for the commissioner moved to dismiss, claiming that a suit could not be maintained, since its object is to restrain the assessment and collection of a tax, and because the income act provided an adequate and complete remedy at law. The lower court upheld the defense, and the higher tribunal affirms that action.

KLAXON GRANTED INJUNCTION

New York, Feb. 3—Special telegram—Judge Lacombe has granted a temporary injunction in favor of the Lovell-McConnell Mfg. Co. in its suit against the Heinze Electric Co., in which it charged unfair competition, alleging that a large motor-operated horn made by the Heinze company is an imitation in appearance of the right-angle design of the type L Klaxon. It will be remembered that this matter came up during the New York show. The suit is in the United States district court for the southern district of New York.

ANSWERS RITZ SUIT

New York, Feb. 1.—The Driggs-Seabury Ordnance Corp., Sharon, Pa., has filed its answer in the suit of the Ritz Cycle Car Co., of this city, which recently asked for \$50,000 damages, alleging that the Driggs-Seabury corporation failed to carry out its part of an agreement entered into April 8, 1914. In its answer the Driggs-Seabury corporation denies that the Ritz Cycle Car Co. has been irreparably injured by any of its acts and asks for the dismissal of the bill of complaint for lack of jurisdiction, inasmuch as the Driggs-Seabury Ordnance Corp. has no designated agent in the state of New York or in the southern district of New York. The agreement in question, it alleges, was entered into at Sharon, Pa.

The answer goes on to charge that the Ritz company did not furnish workmanlike

drawings, plans and specifications of the car in accordance with the agreement in sufficient time to permit the manufacture of the cars in the time specified. It also alleges that payment was refused on the two notes for \$2,500 each given by the Ritz company to cover, among other things, the necessary dies, jigs, tools, etc., for the manufacture of the car.

The answer claims that the agreement provided that in the event of cancellation the Ritz company should assist the Driggs-Seabury corporation in marketing any cars left on its hands. It alleges that the Driggs-Seabury corporation spent \$2,337.17 in building a car at the order of the Ritz Cycle Car Co., for which it never has been paid. With protest fees on the two unpaid notes and accrued interest the Driggs-Seabury corporation claims the Ritz Cycle Car Co. owes it \$7,339.72. It asks dismissal of the bill of complaint, denial of the Ritz company's application for injunction, with costs in favor of the Driggs-Seabury corporation and for a judgment against the Ritz Cycle Car Co. of \$7,339.72 with interest.

CHICAGO CONCERN IN COURT

Chicago, Feb. 1—Three creditors whose claims aggregate \$700 have made application to adjudge bankrupt the American Mfg. Co., builder of Partin-Palmer cars. The American Mfg. Co. is a Chicago concern very closely allied with the Partin Mfg. Co., the latter being practically the sales organization for Partin-Palmer cars. The liabilities of the concern amount to over \$125,000 and the assets, which are in the form of car parts partly finished and finished cars, amount to about \$15,000. The American Mfg. Co. is of the opinion that a reorganization will straighten matters out and under such conditions there would be little difficulty, it is stated, in paying all the debts of the company.

The Partin Mfg. Co. only recently announced a new model, the 25, and has for some time been marketing the model 38. Both cars are four-passenger types.

BUMPER PATENT SUIT STARTED

New York, Feb. 1—Suit has been brought against the Charles Weiland Co., of this city by Allen L. McGregor, Chicago, charging infringement of his patent No. 1,088,832 covering a bumper construction. McGregor asks for an injunction and damages.

WHITWOOD QUILTS INDUSTRY

Weedsport, N. Y., Feb. 1—The Whitwood Corp., manufacturer of commercial motor vehicles, this city, will disorganize that corporation and will discontinue the business. The company terminates its existence without financial embarrassment.



Jitney Buses and the Street Railways

AMERICAN tendency to slang is not one generally to be condemned, but the latest addition to the slang dictionary has a merit both in its pithiness and its promise that is likely to give it a more lasting place in the lexicon of American literature than most of its predecessors have attained. The words "jitney bus" seem to convey in their very sound that happy feeling of freedom that the movement itself seems to promise for the strap-hanging patrons of our municipal transportation systems.

JITNEY bus, as a term, is approximately 3 months old, but the method of carrying passengers for hire by motor car, which the term is meant to express, is much older. Recent agitation of motor vehicle passenger transportation at low cost seems to have come from the Pacific coast, where some few months ago, the streets of the major California cities suddenly became flooded with small four and five-passenger cars which would take passengers anywhere within the city for 5 cents, a sum slangily known in the west as a jitney.

LOS ANGELES seems to have been the first to take to the jitney bus to any extent and in the 3 months since its appearance on the streets of that town, over 1,000 vehicles have entered the service. San Francisco followed last month and now has an association of jitney men representing more than 200 cars. In Austin, El Paso, San Antone, jitney buses are doing a large business.

THOUGH the term was first applied to the smaller cars of not over seven-passenger capacity, it has become extended to take in the class of service generally known as motor buses, that is motor cars carrying twenty or thirty passengers running on regular routes and regular schedule and charging 5 or ten cents fare. New York has had its motor bus lines for several years; St. Louis is installing a system. Detroit's new service, inaugurated this week by the Detroit Jitney Bus Co., expects to have sixty-eight in service early in the summer; Chicago has a very definite movement on foot toward a comprehensive service of motor buses.

IT SEEKS significant that in most instances where the cheap motor service has been installed, it has been in municipalities in which the older transportation systems have given inadequate or unsatisfactory service. The very success that the older motor bus lines have had and the mushroom growth of the individual jitney buses, with small carrying capacity, has shown the need of some system to supplement the less elastic electrical traction.

The Mountain Comes to Mahomet

IT is to be expected that as the European war progresses, American motor cars, whether of the touring type or of the truck type for heavy service, will meet with increasing approval from the heads of the motor transport divisions of the various armies. This will be true, not solely because necessity will force their use as the stocks of European-built cars are depleted, but for two other reasons. One of these is that as the drivers become more accustomed to handling them with use, any difficulties that present themselves in the operation of American products will disappear.

NATURALLY enough, traction interests are very much aroused over the invasion of the new bus lines and they are quite loud in their condemnation and in their prophecies of failure. In Los Angeles, more stringent regulations are demanded of the city council. In Texas, the street railway interests are appealing to the legislature for relief from the tremendous inroads the jitney buses are making into their earnings. The Houston railway people state that the earnings of the street railway have been reduced more than \$1,000 per day. The Inter-Borough and New York Railway Co., which controls most of Manhattan traction lines, has stated that the motor bus competition would cut deeply into the profits of the traction company.

TRACTION interests throughout the country freely predict bankruptcy for the jitney bus companies and also that the operation of the cars will greatly increase the number of accidents. Neither one of these prophecies seems likely to be fulfilled. If we take the New York service as an instance, the mortality records refute the statement that buses are more dangerous than street cars. For the fiscal year 1911, the latest figures obtainable, the surface lines on Manhattan Island killed seventy persons and injured 11,500. The Fifth avenue bus lines, which equal in mileage 2 per cent of the mileage of the traction companies, killed none and injured thirty-two. The street cars injured one person in every 17,000 miles as against one person in every 120,000 miles for the buses; or about seven times as many per 100,000 miles. Similar figures on the London buses show them 50 per cent safer than the street cars.

AS TO THE question of profits, the Fifth avenue buses in New York, which numbered 125, show a net income of \$190,000 for 1914. This is based on the carrying of 11,300,000 passengers with a total collection of fares of \$1,127,000. This gives an income per bus mile of 39 cents and a profit of approximately 7 cents per bus mile.

TRACTION interests urge that installation of motor bus systems will greatly increase traffic congestion. Such, however, does not seem to be borne out by the figures of the London board of trade which show that for the 10 years elapsing between 1903 and 1913, the number of journeys taken by Londoners over the streets increased 100 per cent without a corresponding increase in traffic. This, the London board of trade holds is due to the predominance of motor traffic, which is about 94 per cent of the total traffic in London.

AMORE potent reason, however, is the fact that road conditions are becoming rapidly at least as bad or even worse than those of the bulk of American roads, for which the cars originally were designed. In other words, instead of having to redesign their products for the better road conditions of Europe, manufacturers are finding that the roads over which the war vehicles operate are changing so that they more nearly approach the worst conditions in their native habitat, so of course Yankee cars will show their true worth.

Halls of Congress Ring With Praises of Motor Car

Utility of Power-Propelled Vehicle Outlined by Representative Stafford

WASHINGTON, D. C., Feb. 1—A provision in the Indian appropriation bill, appropriating \$15,000 for the purchase of twenty motor cars for the use of superintendents, farmers, physicians, field matrons and other employes of the Indian field service, aroused a big debate in the house of representatives. Many members were opposed to the appropriation, while others urged it. It was finally decided to leave the provision in the bill. A particularly forceful plea for the motor car was made by Congressman Stafford.

"Because I believe that motor cars add to the efficiency of the service, no matter in what departments that service may be, I rise in opposition to the antagonists to motor cars in the government service," he said.

"Every committee of this house that has consideration of transportation has recommended from time to time the substitution of motor service for the old, obsolete horse-drawn vehicles. Even in the postal service we find the rural carriers themselves voluntarily purchasing their motor cars, because their work can be done more cheaply and more efficiently. Those who are seeking to convey the idea that a car is an extravagance fail to take into consideration the value of the service of the official in his work of disseminating knowledge. If it were the purpose of the superintendent, of the doctor, of the matron, of these inspecting farmers, to remain in their offices, why, then, perhaps it might be considered as an extravagant proposition to afford them motor cars. But when we know that it adds to the efficiency of the service to allow them to go afield and come in contact with the Indians, it cannot be considered as extravagance at all, because you are but multiplying the time and efficiency of the official.

"It has been my good fortune to know very well a country doctor whom on occasions I visit on week ends and accompany about the country district where his practice exists. I know that his field of clientage has been extended twice by reason of having a small, inexpensive motor car. I know that he can care for many more patients. I know that the cost is much less, when you consider the territory covered, than the old abandoned, obsolete service of horse-drawn vehicles.

"The department, according to the hearings, comes before the committee and asks for an increase of thirty motor cars. They have in use at the present time 118. There are 135 superintendents. No provision whatsoever is made for doctors and the other employes of the Indian service who need motor cars in going about the districts, and the committee has recommended an increase of twenty, not twenty touring cars, but twenty motor cars, the

average price of which would be \$750 each. Can anyone consider it as extravagance to replace perhaps a few of these 118 that are worn out? Why, I wish to call the attention of the house to the fact that one of the rural carriers in Waukesha county last year ran his car and served his district with it for 10 months, in all kinds of weather, and found it more economical to do so.

"We find it more economical in the postal service to substitute motor cars in city delivery service."

DETROIT FORMS EXPORT CLUB

Detroit, Mich., Jan. 30—Following a luncheon given at the board of commerce yesterday, in honor of William C. Downs, commercial attache of the United States in Melbourne, Australia, the Export Club of

Detroit was formed. Many prominent business men whose specialty is the export business were present at the meeting and it was considered that Detroit's importance from the export point of view is rapidly becoming such that it will greatly benefit the manufacturers and business in having an organization which will devote all of its time to promote and further the interests of those concerns doing an export business.

Among the representatives from the motor car industry present at the luncheon were John A. Olt, foreign manager of the Hudson Motor Car Co.; C. R. Cook, export manager of the Cadillac Motor Car Co.; J. L. Hibbard, foreign manager of the Studebaker Corp., and H. F. Vortkamp, president of the National United Service Company.

See America First — • • • See America Now



EDITOR'S NOTE—This is the twelfth of a series of illustrations and thumb-nail sketches of the scenic and historic wonders of America to be run in Motor Age with the idea of calling the attention of motorists to the picturesque points of interest in their own country.

NO. 12—ANCIENT CITY GATES AT ST. AUGUSTINE, FLA.

Every motorist, entering St. Augustine, Fla., from the north, passes through the picturesque city gates which are a heritage of the romantic days when Florida was a Spanish province. Guarded by ancient cannon, muzzled and silent; with iron-barred doors behind which sentries once stood; constructed of native coquina that has withstood the ravages of time, these gates are a prologue to a historic drama that every tourist who visits the ancient city of Ponce de Leon applauds.

Chicago Show Pleases from Standpoint of Business Done

Week Filled with Meetings and Trade Functions

CHICAGO, Jan. 30—Despite typical Chicago show weather the fifteenth annual motor car show had drawn an attendance 10 per cent greater than any previous exhibition, when the doors were closed at 10 o'clock tonight. The attendance in point of enthusiasm as well as in numbers overshadowed previous exhibitions, the spirit of optimism being much more in evidence among makers and dealers and sightseers than it was at New York.

Although the actual figures as to the number of visitors at the Coliseum, the Armory, the Greer building and the Coliseum annex, which housed the exhibits, are not at hand as yet, Samuel A. Miles, under whose direction the show was staged, gives it as his belief that the gate receipts were at least one-tenth greater than they have been in previous years. However, the most significant fact is the very much increased number of dealers this year. Usually 3,000 dealers is the maximum attendance at the Chicago show and the management had prepared this year for 3,500 dealers. By Thursday that number had been passed and it was necessary to make some last-minute arrangements for the 1,000 additional dealers who made their appearance during the last 2 days.

A large percentage of the exhibitors had closed the majority of their territory before the opening of the show and their exhibits were made less for the purpose of getting new dealers than for the general publicity obtained and to form an object lesson in giving sales points to their new dealers.

Business done at the show far exceeded the expectations of the exhibitors, if their statements at the beginning and end of the week are to be believed. The general feeling among the exhibitors on the opening day seemed to be that they would be disappointed if any great direct results were to be expected. But the end of the week found them all enthusiasm and highly elated over the number and size of actual sales made and the number and quality of the prospects directly resulting from the show.

Nearly every manufacturer who exhibited has a story of unexpected sales and those whose territories were not previously closed find their sales field considerably extended. Several trainload orders of cars are credited by car manufacturers directly to the work done in Chicago. Prophecies are more prevalent tonight than for many months that the coming season will find most of the larger manufacturers sold out before the middle of summer.

The annual show at Chicago has been the signal and occasion for a number of

get-together dinners of manufacturers, dealers and the various organizations of the trade. This week has been exceptionally prolific in outside affairs of this sort. In fact, it has been a subject of humorous comment that many of the dealers and officials of the manufacturers, who have been in town for the last 10 days did not get to the Coliseum until within a day or so before the exhibition closed. Their time was taken up with the round of sales talks, conferences, dinners and so on to such an extent that the exhibition proper was a secondary matter.

One of the most important of the developments of the week was incidental to the Chicago show. This was the formation of a national association of garagemen and dealers called the Associated Garages of America. This is the national organization for which Illinois garagemen have been working for several months. The move was made as a result of the convention of the Garage Owners' Association of Illinois Tuesday and Wednesday. Representatives of the organizations in the various states were called by the Illinois organization.

MANY TRADE DINNERS STAGED

Chicago, Jan. 30—No matter what else the Chicago show may be, it is the cause of a host of dealer and factory dinners. The breeze from Lake Michigan evidently sharpens the appetites of the visiting motor car men and augments their speech-making proclivities.

Overland started the ball Monday night at the La Salle, and the same evening the White Co. inaugurated a daily buffet meeting in the Annex; this was largely an in-

formal sales talk and lunch. Tuesday noon there was a Chalmers session and lunch at the Auditorium. The same noon the Chicago division of the Electric Vehicle Association met at the Metropole and that evening after the show the Electrolytes, who are the merry-makers of the E. V. A., met at Kramer's.

Wednesday noon the Dodge dealers dined in the Railroad Equipment Club; the same noon the garagemen at their convention were dined by the Commonwealth Edison Co. at the Metropole. The Saxon men ate at the Annex in the evening and at the same hour and place the Franklin dealers and also the Reo agents dined. In the Railroad Club, E. P. Chalfant, of the Electric Automobile Manufacturers' Association, addressed a number of electric dealers and garagemen. At the same hour, in St. Hubert's Grill, the Rich Tool Co. entertained a party of tradesmen.

Reo dealers were banqueted in the Annex the same evening and the Ford dinner that night at the Sherman was one of the largest held. Wednesday, Mitchell took a party of dealers to the factory, where they were entertained all day.

The Chicago Automobile Trade Association started Thursday's program with a dinner to visiting dealers at the Chicago Athletic Club, explaining its Central Used Car Market Report. Jeffery dined its dealers at the Congress, Crow at the Congress, King at the Metropole and Scripps-Booth at the Chicago Automobile Club, while the garagemen banqueted at the Lexington; Paige met at the Metropole; the Thermoid western men dined; Chandler dined its dealers at the Annex and there were other smaller and more exclusive parties.

Oakland Makes Economy Run for Show Visitors

CHICAGO, Jan. 28—On one of the coldest days of the year, an Oakland 37 roadster with a Marvel carburetor, yesterday made an official economy run on Chicago's boulevards, and accomplished 23.7 miles on 1 gallon of gasoline. The economy test was held under the sanction of the American Automobile Association, the test being supervised by Darwin S. Hatch, of Motor Age, representing the contest board of the A. A. A.

The car was driven by Al. Meisner, of the Chicago Oakland branch, and with him rode E. A. Turner, of the Chicago Automobile Club, as observer. The gasoline and oil used was supplied by the Texas Oil Co., and according to the official report the fuel was 61.25 Baume gravity at 35 f. This would be 63.65 Baume at 60 degrees Fahrenheit. The gallon measure was stamped correct by the city sealer of Chicago, and the speedometer was checked for accuracy.

In view of the very adverse weather con-

ditions, the record made yesterday is considered particularly good by the Oakland company, although it does not equal the mark of better than 27 miles, made in an unofficial test some time ago.

The mercury during yesterday's run covered between 5 and 6 degrees above zero, and an 18-mile wind was blowing from the northwest. This made it impossible to keep the motor warm enough for best economy, and also made hard pulling as the greater portion of the route happened to be in a northerly or westerly direction. Even with the radiator half covered with paper, it was impossible to keep the motor as warm as it should be. The motormeter showed only 10 degrees Fahrenheit at the start, and never indicated a water temperature of over 170 degrees. Wheel slippage, due to snowy, icy streets probably resulted in an appreciable reduction of mileage.

Additional interest to the test was given

by the presence of a delegation of 150 members of the Garage Owners' Association, which is in Chicago organizing a national body. Another feature of interest was the attempt of a woman driver in an Oakland model 37 touring car to make the same mileage as the roadster. The touring car was driven by Mrs. K. L. Taylor, of Atterbury, Mass., and the run was officially observed in the same way as that of the roadster. Mrs. Taylor did not equal

the distance made by the roadster in the first test.

The Oakland that made the better mileage was a model 37, four-cylinder car, of 3½ by 5 inches, bore and stroke, and was fitted with a Marvel carburetor, Delco electric system, Stewart vacuum fuel feed, and Goodyear 33 by 4-inch tires. The roadster according to the officially balanced scales, weighed 2,875 pounds with its load, and 2,510 pounds empty.

Garagemen Meet and Form National Association

CHICAGO, Jan. 28—The Associated Garages of America, the national association of garagemen for which the Illinois garagemen have been working for several months, was organized in this city yesterday. While not all the states which contain organizations were represented in person, many have coöperated in the work and it is expected that it will be but a short time before the roster of member associations will assume gratifying proportions.

Robert Bland, Evanston, Ill., former president of the Garage Owners' Association of Illinois, and one of the leaders in the national organization work, was made president without an opposing nomination. F. A. Boane, president of the Detroit garagemen, was named treasurer; the office of secretary was made appointive by the board of directors. William L. Rudd, Chicago, one of the fathers of the organization movement in the west, was made vice-president.

According to the plan of organization each state will have two directors and a vice-president.

Directors thus far named are:

New York—William Haradon, Royal Garage, New York.
Illinois—John A. Cameron, Chicago, and Charles L. Turner, Peoria.
Michigan—L. C. Steers, Detroit; 518 Garage, Ohio—F. E. Avery, Columbus; F. E. Avery & Son.
Iowa—N. T. Miller, Des Moines; secretary of the Iowa Automobile Business Association.
Colorado—M. Foster, Denver; of W. W. Barnett.

L. C. Steers, Detroit, Mich., proposed that the purchasing committee of the Garage Owners' Association of Illinois be requested to act temporarily as the purchasing committee of the national association and that it be requested to extend its work into other states. This was done. The association has under consideration several plans for securing supplies for the garagemen at reduced prices which it will act upon soon.

It was voted to hold the next convention in Chicago during the motor car show. The convention followed directly that of the Illinois association and both were concluded Thursday evening with a banquet at the Lexington hotel.

WANTS HIGHER GARAGE RATES

CHICAGO, Jan. 28—Increase in garage storage rates may result from the convention of the Garage Owners' Association of Illinois held Tuesday and Wednesday.

the whole country. He said the condition of the dealer in many instances is criminal and he went unqualifiedly on record as in favor of selling the buyer the new car and then entering into negotiations as to the allowance on the old car. The weakness of the dealer in handling used cars, he said, was in hanging onto them too long; once taken in they should be turned over quickly and not be made dust accumulators.

President H. M. Allison and Treasurer Henry Paulman, of the association, dwelt at length on the work, how it has been developed and what is planned for the future. Ten trade associations, they stated, are subscribers and the present issue is 140 greater in circulation than the one preceding. Among other cities, St. Louis agreed to coöperate.

NEW LIST ON 1½-TON FEDERAL

Detroit, Mich., Jan. 27—A feature of the 3 days' convention of the dealers of the Federal Motor Truck Co., which was held last week, was the decision to lower the price of the 1½-ton worm drive Federal from \$1,900 to \$1,800 and the addition of a 3½-ton worm-drive chassis to sell at \$2,800. The various discussions among dealers and factory men also brought about some minor constructional changes in the Federal.

NEW EIGHT AT COLUMBUS SHOW

Columbus, O., Feb. 1—Vastly superior to any of its predecessors, both in elaborateness of its decorations and in the number of cars exhibited, the third annual show opened in the Memorial hall, Columbus, January 30, to continue for 1 week.

Preceding the opening was a parade of cars numbering several score, although the number was cut down by the heavy snow, which fell during the evening. The crowd on the opening night was quite large, when the weather is taken into consideration.

In all, forty-one makes are represented by about fifty-five different cars. Twenty-four accessories spaces are provided in the foyer and the balcony.

According to the dealers and manufacturers which had cars on exhibition, the outlook for the industry in central Ohio is rapidly growing better. Farmers have been especially prosperous and there are bright prospects of larger sales than usual in the rural districts. In addition the city population is showing much interest in the 1915 models and sales from the urban sections will be about the same as the previous year.

While the cars are not exhibited in the Memorial hall, the Monitor and the Monitor Jr., two new models brought out by the Cummins Auto Sales Co., North Fourth street, were shown in the sales rooms at that place. The Monitor is an eight-cylinder car which sells for \$1,275. The Monitor Jr. is a four-cylinder five-passenger car, retailing for \$725.

EXPLAINS USED CAR REPORT

CHICAGO, Jan. 29—A logical explanation of the Central Used Car Market Report was given today at a luncheon of the Chicago Automobile Trade Association to dealers, representing the middle west. They were present as a part of the association's plan to make its report national in scope.

The situation was summarized by Alfred Reeves, general manager of the National Automobile Chamber of Commerce, in a comparison of the market report with an umbrella which the Chicago association is endeavoring to extend over the trade of

French Put Forty New American Trucks in Service

Bradley Describes Trip Over Road from Havre to Paris

By W. F. Bradley

PARIS, Jan. 18.—Forty American trucks, eastward bound, passed through the gates of Paris without attracting the least attention. They were driven by French army chauffeurs, they carried a few French soldiers, they were accompanied by a couple of French touring cars with sub-officers aboard. But the public is not sufficiently initiated to distinguish between French and American trucks; a French soldier is too common a sight to cause the eyes to be raised; indeed, it is the healthy looking man in civilian dress who attracts unfavorable attention these days. Thus the convoy passed out of Paris, bound for the firing line, with even less attention being paid to it than to the string of market carts coming in at that particular moment. The drivers of those carts had to comply with civilian regulations, and there was the town tax to be collected, for war does not lessen the activity of the tax collector.

Those forty American trucks were divided into two convoys: In the lead were twenty Pierces; a mile in the rear were twenty Packards, all 2-ton models.

Part of Vast Fleet

A month before those machines were respectively in Buffalo and Detroit. Ten days before they had been swung out of the hold of a steamer at Havre, they had received their last finishing touches at the hands of American engineers, and had then been sent by road to an important motor car depot outside Paris, where they formed part of a fleet of 6,000 cars of every known make and type, ready to be moved to the front in accordance with orders from headquarters.

This reserve depot is not the only one maintained by the allies in France. In the center is an equally important station where an equally large number of cars is maintained for such calls as the headquarters staff thinks it necessary to send out. We are all in ignorance of the general



RECENT CONSIGNMENT OF PACKARD TRUCKS ON ROAD IN FRANCE

plan, and it would serve us little to know it. But this much can be perceived—that at a certain critical moment the general staff may decide to rush some momentarily weak point, and when that moment arrives it will be necessary to move the men up quicker than they can be transported by train. This is one of the few romances of war, that troops who are 30, 40, 50 or 60 miles away can in a few hours be carried forward and flung into the battle line before the enemy has had time to realize their existence. This happened in the rout of the Germans crowding on Paris—and it may happen again.

Set to Work

The two convoys in which we are interested were engaged in no such dashing scheme. They had laid in the reserve depot 3 days when the order came to move them up to the gare regulatrice—the railroad distributing depot—occupied by the Fifth Army Corps. At 7 a. m. the next

morning they moved away to a signal given by whistle.

Never, until I joined this convoy, did I realize the importance of good drivers for motor trucks. In reality there were two convoys, for the twenty Pierces and the twenty Packards were in the hands of different officers, having identical orders and instructions to keep in touch with one another. The Packards went away first, although the order should have been inverted, for it was soon evident that the Pierces were governed for a higher speed. However, matters soon righted themselves outside Paris, when the Packards were drawn up to wait for a straggler and the Pierces went ahead.

After 3 hours running with the convoy of Pierces, the truth was impressed that there is nothing more monotonous than traveling with a well-regulated convoy. Caring for the Convoy

A marchal des logis, a meek, unmilitary type of man with little initiative, rode on the first truck and let things take their course. The driver of the leading truck was a professional chauffeur who had, up to a week before, been at the wheel of an armored car. He understood motor cars, he had a mechanical instinct which put him at ease with a make of machines he had only known for a few hours, and his knowledge of the country was sufficient to remove all hesitancy at cross roads. Thus the officer buried himself in his greatcoat, or awoke to smoke a cigaret, and occasionally to look back at the line of trucks trailing over the sand-colored road. If there were any inexperienced drivers in the convoy, they knew enough not to make themselves conspicuous. Each man kept his position in the column, maintaining



A CONVOY OF TWENTY PACKARD TRUCKS IN FRENCH ARMY SERVICE

his regulation pace of 30 yards from the truck ahead, and when occasional stops were made at the entrance to important villages, it was to discover that there were no stragglers, and that there were no interpositions in the numbers 1 to 20 carried on the tailboard of each truck. At each of these stops the touring car bringing up the rear would run to the head of the column, report to the officer and receive instructions from him, and 5 minutes later the column would be on the move again. A railroad train never moved with greater regularity, and during the 2 days I spent with them I never saw a driver in this convoy open his tool box or do any other work on the truck than the removal of the floorboards to give him the benefit of the heat of the motor.

The second column, to which I dropped back in quest of more incidents, was in charge of a young, energetic *marechal des logis*, who had not been long in discovering that he had been given a difficult task. Five of his twenty drivers were green hands, and those five were capable of disorganizing the entire convoy. Even on a straight, easy road the difference between the two convoys was apparent. On hills the men clung to top gear much longer than was necessary; when they tried to change down they fouled their gears, came to a stop, allowing the truck behind to close up to such an extent that there was danger of a collision. The order in which they were numbered was not long maintained. The good drivers got in the front, the first half-dozen vehicles came along with some regularity, while the others followed at varying intervals, and one man was nearly always an hour behind the leader.

Green Drivers in Trouble

During the afternoon, when traveling over the hilly country between Meaux and Lizy-sur-Oureq, where one of the fiercest phases of the battle of the Marne was fought, the driver of a Packard used his brakes in such a way that he bogged his truck in one of the ditches used last September by the Germans in their retreating fight over this country.

It was almost dusk when this incident

occurred. Experienced men might have had the truck out in half an hour, but the green hands labored with pick, shovel, and rope for a couple of hours before the Packard was back on the road. Then it was dark; only side lamps were fitted and not a man in the convoy knew the road. The next trouble was on a winding down grade, when a driver charged a tree in endeavoring to get round a bend. His radiator was damaged, but by frequent stoppages for water he was able to keep going.

A Midnight Trip

Before midnight the inexperienced men were physically exhausted; the more competent drivers were suffering from nerves, and the blunt expressions of opinion which

convoy of Pierces, which had left Paris at the same time, had reported in at 6 o'clock, and the men had all been off duty at 6:30 p. m.

A Question of Drivers

Next morning the Pierce convoy was ready to move off at 8 o'clock, every unit being in perfect shape. The second convoy had one truck which had to be towed and a second which needed frequent applications of putty and water to its radiator. Thus, in the first column the men were enthusiastic on the subject of American trucks. In the second, while they had sufficient sense to recognize that the men and not the trucks were at fault, there was no superfluous enthusiasm on any subject.



PIERCE TRUCKS CLIMBING LONG HILL OUT OF THE AISNE VALLEY

were passed from man to man did not tend towards harmony. It was not until 1 a. m. that the convoy ran into the gendarmerie courtyard indicated as the stopping place for the night. But the last few yards brought another accident. One of the men, worn out and nervous with the work he was little accustomed to perform, missed the entrance to the yard and took his truck on a bee line for a low bank. The Packard mounted it, but in doing so smashed its crankchamber. The men were dismissed at something after 1 a. m.; the

The fault was that men had been selected without sufficient inquiries as to their ability to handle a truck, the government driving license being considered sufficient guarantee. One man admitted that he had never previously driven anything but a motorcycle. Another, evidently the son of a wealthy family, had had just sufficient driving experience on one of his father's cars to get the government ticket. The lurid remarks of a professional Paris chauffeur who was obliged to drive behind the young man of wealth would be interesting reading, if they could be translated.

The Pierces moved ahead and were not seen again until night. Despite the truck in tow and the vehicle with the leaky radiator, the second convoy moved forward much better than on the previous day; the men were shaking down to their work. Nevertheless, the *marechal des logis* was kept busy running up and down the line in his endeavor to prevent some of the stragglers dropping off altogether. As the man at the head of the column was unacquainted with the country, I offered to act as pilot into and through the town of Chateau-Thierry.

There are two roads out of this pillaged and bombarded riverside town, one of them comparatively easy, the other very



FRENCH SOLDIERS GATHERED AROUND A PIERCE-ARROW TRUCK

difficult to climb. In order to have the opportunity of seeing what the trucks and drivers could do under really severe conditions, I took the difficult road, and getting into low gear watched the convoy climb the greasy hill side. Nothing happened; at the sight of the hill and the thick mud all the men got into low gear and the hill was climbed with more regularity than any previous portion of the road had been covered.

Our journey ended at Fismes, where there is a railroad station from which these trucks have to deliver food and ammunition to the troops billeted in the villages and farms around, and in the firing line a few miles to the north. In this stage of the war the work is of a very regular nature, adhering closely to a prepared schedule. The movement of the troops is measured in inches and yards. Thus day after day these American trucks are going out from the station to the bivouacs, to designated points immediately behind the trenches, with as much regularity as they might undertake a delivery service at home.

Before they were put into this service there were some staff changes. The men who had shown their incompetence on the initial run were removed from the steering wheel and replaced by others of proved ability. Whereas on our run to the front there had been but one touring car for twenty trucks, there were two for each convoy—one ahead and one astern—for all the work along the front. The mistakes which only entailed a delay on the run from Paris, would certainly be followed by death or capture when working near the firing line. Further, at least two men were carried on each truck, and both were armed, for although it is not the business of the supply columns to fight, the men have to be prepared to resist an attack.

Scene of Stiff Fighting

The district in which these two American columns now are working, was the scene of one of the most bitter phases of the battle of the Aisne. At that time the lines here were held by the English, who drove the enemy back, step by step until they got them over the rivers Vesle and Aisne, and into the heights above Aisne, where they have been strongly entrenched for some time. Much of the work has to be done away from the main highways, the surfaces being equivalent to those of the average country road in Indiana or Ohio at this period of the year. At places, where shells have fallen, or traffic has been particularly heavy, it is necessary to go further west to get the equivalent of the roads over which the columns are working. The difficulties are increased, too, by the fact that there is more traffic than on similarly surfaced roads at home.

Despite efforts to keep traffic as much as possible moving in one direction, there must be a certain amount of passing. The congestion in these small railroad stations,

of no importance until the war broke out, is difficult to describe. It is like a busy approach to a New Jersey ferry, with the space reduced one-half, all the civilians removed, and motor cars representing 90 per cent of the traffic. As to the direct signs of war, there are few. There are more sounds than signs. The boom of the heavy artillery, the sharp crack of the French army's big guns, the hiss and plop of shells maintain an unending concert, but nobody but a newcomer pays any attention to them. It is so impersonal, there is so little to see—men may remain within sound of the guns for weeks without

out seeing a battery in action—that until a shell drops in the immediate neighborhood the truck drivers look upon their business as the real thing and the fighting something distant and intangible.

These forty American trucks I was able to follow to the front represent but a small percentage of the American motor cars now serving with the allies. The present time is one of repairs and preparation, and the arrival of foreign machines in big quantities is making it possible to overhaul, and replace when necessary, the French trucks having been on duty since the outbreak of hostilities.

Motor Bills Grist for Legislative Mill

Two Score and More Measures Pending in Massachusetts

BOSTON, Mass., Feb. 1—More than forty bills relating to motor legislation have been put in at this session of the Massachusetts legislature. Last week the committee on roads and bridges gave a hearing to the ones submitted by the highway commission, and there was no opposition to them. From now on the motorists will be kept climbing to the state house to praise or oppose the various measures.

There are six bills alone relating to the dimming of headlights. The highway commission has been experimenting with the subject and so it may put in some evidence. One bill calls for all owners of motor cars to take out insurance of at least \$3,000. Another one along the same lines does not name the amount. There is a bill to make it compulsory for the highway commission to revoke the license of any man who fails to settle a judgment for damages in which his motor car figured, in other words making the highway commission a club to force payment.

There is a bill to compel pedestrians to cross the streets at the crosswalks. Two bills deal with signboarding the highways, something very needful, for the small towns now pay no attention to the state law that says it must be done. The highway commission is preparing a plan to have all New England states adopt uniform colors along the through routes, one color for the right hand side and another for the left. New Hampshire now has its roads so arranged. There is a measure to have all operators examined for physical defects and bad eyesight.

Another effort will be made to get through a flat rate of speed of 25 miles an hour, and also to have motor cars stop when an electric car is taking on or off passengers. There is a bill relating to non-residents, and another would take chauffeurs out of the domestic service class and put them under the workmen's compensation act. A bill has been put in to compel motor cars to be lighted on side and rear when standing at night on the road. Another petition would put all motor cars under the same regulations as street cars as

to speed and law when being operated in cities. There is a bill on trucks and one on second-hand cars relative to registrations and sales of these vehicles.

Hunting from a motor car will be prohibited if another one is passed. The registration of a motor car cannot be used as part of a defense in an action of tort, is the basis of a petition. The hours of chauffeurs will be regulated by another measure, and a still further one seeks to make chauffeurs more responsible. There is a resolve to find out the number of taxicabs in Boston, and a bill has been put in to allow the employment of convicts on roads.

Some of them will be enacted, and others will be thrown out. Already a committee has been formed comprising representatives of the Automobile Legal Association, National Automobile Association, Bay State A. A., Boston Automobile Dealers' Association, Massachusetts State A. A., Massachusetts Automobile Operators' Association, Massachusetts Garage Association, Electric Motor Car Club and Boston Accessory Dealers' Association to appear before the committees and tell the motor side of these questions. At a meeting of the committee a few days ago resolutions were adopted favoring the Adamson bill now before congress, and copies were sent to Senators Lodge, Weeks, Congressmen Gallivan, Mitchell and Roberts.

DETROIT'S NEW TRAFFIC LAW

Detroit, Mich., Feb. 1—The revised traffic ordinance was adopted at last week's common council meeting and will go into effect March 1. Its principal new provision is that all vehicles whether motor cars or horse-drawn, must carry a tail light.

Vehicles carrying material or loads which project out and beyond the dimensions of such vehicles must have the light attached or fixed at the extreme end of the part projecting out of the vehicle.

All motor cars must be provided with two lamps on the front and two in the rear, one a red light and the other a white

one which is to project its rays upon the number plate.

All other vehicles must carry a red light in the rear, visible at a distance of at least 200 feet. Motorcycles and bicycles must carry a white light in the front and must be visible at a distance of 100 feet.

Headlights must be dimmed. The commissioner of police will have the authority to examine or have examined and tested any lamps or lights and he will be permitted to issue certificates that lamps or light have been found to comply with the regulations.

The speed limit in the business district must not exceed 10 miles an hour, and 15 miles an hour outside this district, in the parks and upon the boulevards.

When crossing a main thoroughfare or streets upon which there is a street car track, or making a turn thereon, the driver must slow down to half the legal speed limit.

Between 8 a. m. and 6 p. m. no vehicle may remain standing at the curb more than 30 minutes, in any congested business district.

No vehicle may be parked within 15 feet of a fire hydrant or with 75 feet of a street car stopping place.

On streets divided by parkways driving must be kept to the right of the streets.

DETROIT'S CODE HELD VALID

Lansing, Mich., Jan. 29—The traffic ordinances of the city of Detroit were declared constitutional by the supreme court of the state of Michigan today. The case which brought about this important decision was that of Donald McGraw, who, while driving his motor car struck Mrs. Howard Pearson and was held to be tried by the Detroit recorder's court. He brought a demurrer against the recorder's decision and it is this decision which has now been sustained by the supreme court.

In the course of his decision Justice Kuhn said, among other things: "In other words, the municipality retains reasonable control of its highways, which means such control as cannot be said to be unreasonable and inconsistent with regulations which have been established, or may be established, by the state itself with reference thereto.

"This construction allows a municipality to recognize local and peculiar conditions, and to pass ordinances regulating traffic on its streets, which do not contravene the state laws."

FRISCO FOR SAFETY FIRST

San Francisco, Cal., Jan. 27—If the recommendations of Sergeant Goff, in charge of the traffic squad of the San Francisco police department are adopted by the board of supervisors as a part of the city's traffic ordinance, motorists in San Francisco will be compelled to equip their cars with either non-skid tires or chains when operating them on rainy days, or be com-

elled to travel at a rate of speed not in excess of 10 miles an hour.

Goff claims that many accidents in the city and much blocking of traffic has been due to skidding cars, and he believes that if operators of cars are compelled to equip them with a non-skidding device of any sort, this trouble will cease.

According to the terms of the ordinance recommended by Goff, violators of the law will be charged with a misdemeanor punishable by a minimum fine of \$1 for each offense or 3 months' imprisonment. Goff strongly urges the minimum fine claiming that by a nominal penalty violators will not be disposed to use political influence to clear them of the charge but will pay the forfeit and exert care in the future.

On Goff's recommendation the supervisors adopted a new headlight dimming ordinance which provides a "dark" and a "bright" zone for cars. The "dark" zone covers the downtown or business district in which cars must travel with headlights either out or so dim as to eliminate all glare while in the "bright" zone which is the outlying or residential district, bright headlights may be used provided that the main shaft of light strikes the ground within a radius of 75 feet ahead of the machine.

It is the plan of the San Francisco motorists to have this lighting ordinance adopted as a clause in the state motor vehicle act at the meeting of the legislature now in session. This will mean that California will have a uniform lighting as well as a speed law throughout the cities and towns of the state.

BILL AIMED AT TRUCKS

Warner, N. H., Jan. 14—Prohibiting the operation of motor trucks in the state of New Hampshire unless their owners accept the responsibility of keeping them in good shape as found and liability for all damage to culverts, a bill has been introduced in the New Hampshire legislature, which if prompt steps are not taken, has a good chance of passage. In the opinion of one large user, E. H. Carroll & Sons, of this city, if the bill is not killed in the house, it will make the use of trucks in the state out of the question. The matter has been turned over to the National Automobile Chamber of Commerce and to the Motor Truck Club of America.

RECEIVER FOR U. S. CARRIAGE CO.

Columbus, O., Feb. 1—Upon the application of Mrs. Katherine Myers, wife of Fred C. Myers, president of the United States Carriage Co., manufacturer of motor hearses and buses of Columbus, President Myers was appointed receiver for the corporation. Mrs. Myers claims to hold a note of \$6,000 against the company and fears that other creditors which are pressing will cause a loss to the business.

Receiver Myers immediately gave a bond in the sum of \$50,000. It is claimed that notes aggregating \$90,000 are held by

the company for motor vehicles and other products sold and that many creditors are pressing. The business will be continued under the receivership.

PROPOSES SOLID TIRE TAX

Sacramento, Cal., Jan. 26—Senator E. S. Birdsall has introduced a bill in the senate, the feature of which is a tax on motor vehicles fitted with solid tires. This tax is to be levied in addition to the regular horsepower tax, and is to amount to \$5 for vehicles of less than 4,000 pounds capacity; \$10 for those having from 4,000 to 6,000 pounds capacity and \$15 for those of more than 6,000 pounds capacity.

FRANCE BUYS 100 QUADS

Chicago, Feb. 1—The Thomas B. Jeffery Co., of Kenosha, Wis., has sold 100 of its Jeffery Quad trucks to the French government, it was announced today, an order approximating \$350,000 in value. The order specifies the delivery of fifty immediately, with the remainder to follow at the rate of twenty-five a week. The Quads will be fitted with the same style of body as used in the United States army, a box type with a bow top and a cab driver's seat.

The Jeffery company already is well represented in the European war, France having previously purchased fifty of the chain-drive type of Jeffery truck. The Canadian contingent took with it sixty of the Quads; England has bought twenty-five of them and Russia twenty-five.

MITCHELL MAKES ANNUAL REPORT

Racine, Wis., Feb. 1—Reports of officers of the Mitchell-Lewis Motor Co., Racine, Wis., presented to the annual meeting, showed that during the period from August 1, 1914, to January 1, 1915, the company manufactured and sold more Mitchell cars than during any similar period in the history of the company. The report of President McLaren showed that the debt condition is lower than at any time in the company's existence; that the volume of business, number of men being engaged, number of dealers, and the financial position are larger and stronger at this time than at any time since the concern was founded in 1834. The annual election resulted as follows:

President, H. L. McLaren; first vice-president, John W. Bate; second vice-president, William T. Lewis; treasurer, Frank L. Mitchell; secretary and assistant treasurer, William H. Armstrong; comptroller, Martin J. Gillen; sales manager, Otis C. Friend. The officers enumerated here also comprise the board of directors. Mr. McLaren also is general manager.

CARS CALLED FARM PROPERTY

Three Rivers, Mich., Feb. 1—at the recent meeting of the Three Rivers Farmers' Fire Insurance Co., it was decided that motor cars and garages were to be classed as farm property and to be insured as such.

Makers and Promotors Talk Racing Plans at Chicago

Chairman Kennerdell of A. A. A. Guest of Honor at Big Enthusiasm Meeting

CHICAGO, Jan. 29—Chairman Richard Kennerdell, of the contest board of the American Automobile Association, was the guest of honor at a luncheon given yesterday at the Chicago Automobile Club by Motor Age which also was attended by representatives of the leading speedways and by representatives of concerns interested in racing.

At this luncheon a get-together spirit was displayed and the speedway people became acquainted with each other for the first time. Plans were discussed, each track told of its progress on the season's plans and the car makers' representatives outlined what their respective companies intend doing this season.

As a result of this luncheon the promotors have a fair idea of what support they may look for from the manufacturers and at the same time Chairman Kennerdell was able to straighten out several disputes as to dates. Probably one of the most significant facts connected with the luncheon was the statement made by J. G. Vincent, chief engineer of the Packard company, who was present, who told the racing folk that while he could not speak officially for the Packard company, still he would say that if Packard did not race this year he, himself, would have one or two cars in the big events.

For the Maxwell company Ray Harroun stated there would be seven Maxwell racing cars in the big events this year, four of them of the new 300-inch class and the remaining three the same ones the company campaigned last year. Five of these will be raced by the company direct and the other two turned over to E. A. Moross for the dirt track campaign. Harroun has four drivers signed at the present time, including Barney Oldfield, Billy Carlson, Harry Grant and Ed Rickenbacher. The company's first meet of the year will be the Vanderbilt and grand prix where the new 300-inch cars will make their first appearance.

The Stutz company was represented by its sales manager, H. W. Anderson. There will be six Stutzes raced this year, three of them of the 300-inch type and the others the ones campaigned last year. The Stutz team consists of Earl Cooper, Gil Anderson and Howard Wilcox, the last named being the most recent addition to the team.

George Dickson, general manager of the National company, also was among those present and followed the proceedings with much interest. Dickson states that his company will not race this year, but that this does not mean that the big blue cars never will be seen in speed contests again. He urged those present to support the American Automobile Association, pointing out the strong need of a national or-

ganization at this, the most critical time of the sport.

Representing the tracks were T. E. Myers, of the Indianapolis speedway; F. E. Edwards, of the Chicago speedway; Felix McShayne, of the Omaha speedway; E. R. Schultz, of the Sioux City speedway; F. W. Jencks, of the Elgin Automobile Rotaries Association; J. E. Callender, chairman of the contest board of the Chicago Automobile Club; and E. P. Robson, of Galesburg. E. C. Patterson, backer of Ralph de Palma, represented the owners.

From the reports handed in by the speedway managers it looks as if both the newcomers, Omaha and Chicago, will be in position to race this summer according to schedule, as work on their respective plants is progressing nicely. Omaha and Sioux City are still in doubt as to their exact dates, the matter being held up until Tacoma can be heard from.

Considerable enthusiasm was aroused by the receipt of a telegram from J. C. Nichols, representing the New York speedway, who stated that all the necessary money has been raised, the land secured and that contracts are being let, so it is hoped to have the track done by fall so that a big meet can be held sometime in September.

Following the luncheon Chairman Kennerdell and Clifford Ireland, western member of the A. A. A. contest board, who also was present at the affair, visited the new Chicago speedway in company with Contest Director F. E. Edwards. Both were satisfied as to the progress being made and issued the necessary sanction for the 500-mile race, which is scheduled to be run on June 19.

OLDFIELD AFTER A FIAT

Los Angeles, Cal., Jan. 27—Barney Oldfield is negotiating for a Fiat racer to drive in the Indianapolis 500-mile race. Al. G. Faulkner, of the Carlton-Faulkner-Bowles Co., Southern California and Arizona distributors, today cabled the Fiat factory at Turin, Italy: "Barney Oldfield wants French grand prix car. Quote lowest price. What extra parts? Rush cable reply."

From this cablegram it is to be inferred that Oldfield will sever his connection with the Maxwell racing team after the Vanderbilt cup and grand prix events in San Francisco next month.

Leon T. Shettler, chairman of the racing committee of the Western Automobile Association, announced today that a Chalmers car had been entered for the Venice grand prix race, which is to be run over the Venice parkway March 17. Shettler refused to give the name of the entrant or the identity of the driver, but it is be-

lieved here that Earl C. Anthony, Southern California distributor for the Chalmers line, is responsible for the entry.

PREPARING VANDERBILT COURSE

San Francisco, Cal., Jan. 25—The preparation of the course for the Vanderbilt cup and grand prix races which are to be run on the Panama-Pacific international exposition grounds on February 22 and 27 respectively, has been actively undertaken. Numerous measures for the protection of the racers and spectators are being taken which will afford a maximum of safety, in the opinion of track experts. Several of the drivers and race officials have looked over the course within the past few days and have unanimously expressed the belief that it is good for an average of 70 miles an hour.

Most of the course is over the asphalted portion of the exposition roadways. The remainder is macadam. None of the curves is to be banked.

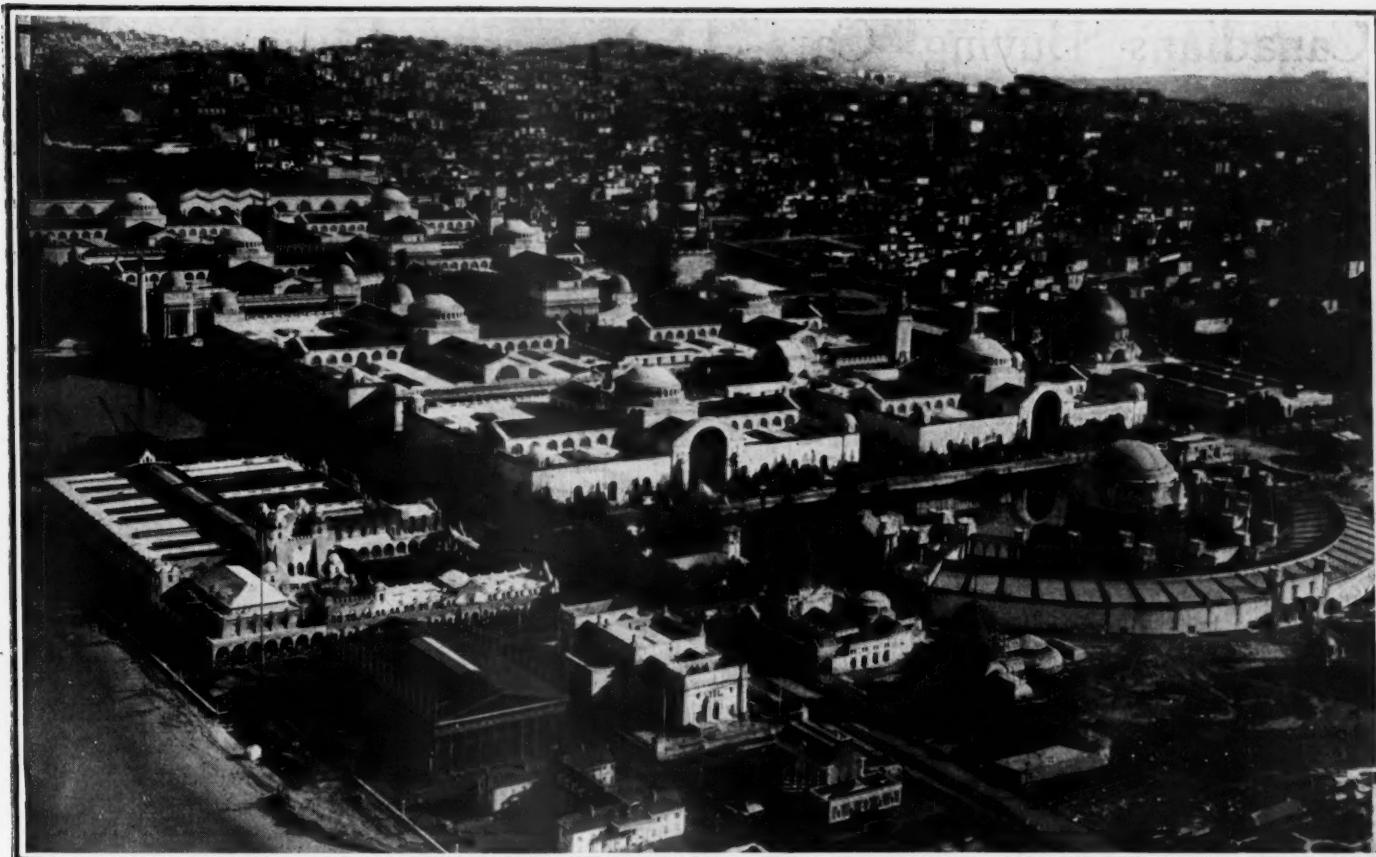
Everything will be in readiness for practice by February 15.

The grand stand, which is on the south side of the horse track forming part of the course, already is practically completed. It has 26,000 seats ranging in price from \$2.50 to \$10.

To date, eighteen entries have been booked for the meet, each driver being nominated for both races. The list is headed by Stutz, with three cars in, the drivers being Gil Anderson, Earl Cooper and Howard Wilcox. Two Peugeots have been declared, one of which will be driven by Burman and the other by Resta, the Englishman. No drivers have been named for the three Mercers, but it is expected the team will be Pullen, Louis Nikrent and Guy Ruckstall. Cadwell is in with the Marmon; Louis Disbrow is to drive his Simplex Zip, which has been rebuilt for road racing purposes; Jack Le Cain is to drive a Chevrolet; Oldfield and Carlson are named for two Maxwells, but it is expected there will be one more in the Vanderbilt and two more in the grand prix, with Rickenbacher and Grant as the extra drivers.

O'Donnell and Alley are to drive the two Duesenbergs nominated; C. R. Newhouse is up in W. E. Wilson's Delage; Jack Gable is to drive the Tahis, while the last entry received is that of E. C. Patterson's Mercedes six, which is to be driven by Ralph de Palma. The entry of Ralph Mulford in a Sunbeam also is expected.

The latest addition to the list of special prizes is one of \$500 offered by Frank H. Wheeler, to be given the winner of the Vanderbilt, provided a Schebler carburetor is used. The same kind of an offer is made in the grand prix.



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VIEW FROM AEROPLANE OF PANAMA-PACIFIC EXPOSITION GROUNDS WHERE VANDERBILT CUP AND GRAND PRIZE RACES WILL BE HELD THIS MONTH

This picture shows the Panama-Pacific exposition as seen from a height of 1,500 feet, taken by Carl Wallen from Silas Christofferson's aeroplane. It shows only a portion of the main exhibit section. In the left foreground is the great Oregon building. Immediately opposite is the New York State building, then comes the Netherlands pavilion and then the great circular Palace of Fine Arts. Immediately to the west of the Oregon building is the New Jersey building, while immediately to the west of the New York building is the Pennsylvania building. To the east of the New York and Oregon buildings is the California building. The avenue that runs between the New York building and the Netherlands building is known as the Avenue of Nations, and forms one leg of the motor race course. In the center of the photograph is the Tower of Jewels, 435 feet in height.

Hoosiers Plan Three Tours to California This Summer

Members of Indianapolis Club To Hunt and Camp En Route

INDIANAPOLIS, Ind., Feb. 1—California will be the mecca of hundreds of Hoosier motorists August 1, when three detachments of transcontinental travelers, all members of the Hoosier Motor Club of Indianapolis, will meet in San Francisco to visit the Panama-Pacific exposition.

The first detachment will leave Indianapolis June 1 in a flotilla of motor cars for a 60-day trek across the continent. The party will follow the game trails rather than the motoring routes, as it is to be a fishing, hunting and camping trip exclusively.

The second detachment is scheduled to check out of this city July 1 and will take a month to reach its destination. The cars will follow the route taken by the Premier ocean-to-ocean tourists in 1911, going by way of the Lincoln highway as far as Ogden and then taking the northern route around the Great American desert.

The third detachment will leave Indianapolis July 26 and will travel by train.

The tour has been arranged by John Guy Monihan, chairman of the touring committee of the Hoosier Motor Club and organizer of the Premier trek of 1911, and will be in his charge. The local club is arousing interest in the motor migration with lectures illustrated by moving pictures. Although plans for the tour have just been formulated, many have signed for the trip and reservations have been made by motorists from all parts of the United States.

BIG CLUB RUN PLANNED

Los Angeles, Cal., Jan. 28—For the first time in 4 years, the Automobile Club of Southern California is to call its 6,500 members together for a 3 day's tour over the boulevards of Southern California, enjoying the pleasures of motor travel in the middle of winter.

It is promised by officials of the club that the 1915 club tour will be the greatest long distance parade of motor cars ever

seen in America. Emergency cars supplied by the Southern California dealers will be on the boulevards and in addition to the members, their friends and relatives, there will be hundreds of cars on the run owned by eastern visitors.

The Panama-Pacific exposition at San Diego is to be the objective point of the motor tourists. All roads are to be put in the best possible condition for the run and the club scout car will be sent out ahead of the members to report any difficult stretches along the course.

Special signs will be erected for the run by the club's route and map service department and special arrangements are to be made for the entertainment of the members while on the tour.

Half the cars will go down the coast route while the other half will travel the inland route. February 12 is the date set for the run and the San Diego exposition officials are planning a great reception for the club members.

Canadians Buying Cars Despite the European War

Montreal Show Brings About Feeling of Optimism

MONTREAL, Feb. 1—The second annual motor show held under the auspices of the Montreal Automobile Trade Association now is a matter of history. The new Ford building was used to house the fifty odd exhibits which represented a total of approximately 250 cars. The attendance during the week was estimated at 50,000 with an average of 8,000 persons daily, which is largely in excess of the attendance of last year. The opinion prevailed among the directors of the exhibition that the people attending the motor show this year were of a better class than was the case last year. Salesmen also stated that the buyers were about equally divided between the city and the surrounding smaller towns.

Summed up briefly, the exhibition just closed was one of the most successful ever held in Montreal and credit is due the Montreal Automobile Trade Association for its optimistic view of conditions and for going ahead with the promotion of the show when facing great odds. An industrial exhibition held in time of war is a manifestation that does the greatest credit to those who participate in it.

The various comments by exhibitors relative to the value of the show were all of one opinion, viz., that business was much better than usual and they were all greatly encouraged by the general outlook. As one representative dealer expressed himself: "We are satisfied with the show and the outlook for business this year. Of course no one can see into the future; even bank managers who are accustomed to giving us forecasts refuse to say anything. The war has opened up many new fields in Canada. It has cut off much European travel and therefore the market here will be larger. We do not want to ignore the fact that the war is in existence, but we do want to ignore its effect on business."

LOUISVILLE SHOW OPENS

Louisville, Ky., Feb. 1—The initial show to be held south of the Ohio river started tonight when the doors of the First Regiment armory were thrown open on the eighth annual exhibition of the Louisville Automobile Dealers' Association. It will continue until next Saturday night. With its 50,000 square feet of floor space, the big military building is one of the leading show places of its kind in the country, there being no pillars to obstruct the view. It presents a most attractive appearance.

Forty-two exhibitors, two more than in 1914, are represented in the show, exhibiting 142 machines, including twenty-eight different makes of gasoline pleasure cars, five electrics and fifteen commercial vehicles. Two of the trucks, the Urban and Old Hickory, built by a local concern, the Kentucky Wagon Mfg. Co., are displayed

here for the first time at a show this season.

Hundreds of dealers, sub-agents and factory representatives are in attendance. It is too early to obtain any sales figures but optimism is in evidence at every booth. Old man Hard Times is absent, for no talk of depression is heard. On the other hand, dealers predict an increase in sales over last year which was a banner one. The bulk of the business at present is being done out in the state where the farmers and people living in the towns and smaller cities are purchasing more cars than ever before. Business men, too, are buying a greater number of commercial vehicles.

Louisville's show is the greatest motor event of the year in Kentucky and marks the opening of the selling season in this section of the country. The district embraced by the local agents, factory representatives and branches, as a rule, covers Southern Indiana, the entire state of Kentucky and in some instances Tennessee, the western portions of West Virginia and Virginia.

Louisville is a motor city, not in the producing sense but from the standpoint of use and distribution. As a distributing point, with its excellent railroad facilities, it ranks with the leaders. A number of the largest factories and tire concerns in the United States maintain branches here. On March 1 the Ford company will begin work on its new assembling plant to be erected at Third and A streets.

Last year the show lasted 4 days but it proved so successful that the public will be given a whole week to inspect the machines on exhibition this year.

HANCH JOINS STUDEBAKER

Indianapolis, Ind., Feb. 2—C. C. Hanch, for 18 years connected with the Nordyke & Marmon Co. and at present treasurer of that concern with general executive authority second only to the president, leaves on March 1 to accept an important post in the executive organization of the Studebaker Corp., of South Bend, Ind. The Marmon people are reluctant to lose the services of Mr. Hanch but feel that the Studebaker proposition offered him such wide opportunities that he could not afford to decline it. Mr. Hanch's duties with the local concern will be divided among other members of the executive organization of the Marmon company.

PORTER TO REMAIN IN EAST

New York, Feb. 1—The Finley Robertson Porter Co., Port Jefferson, L. I., will be represented at the Indianapolis 500-mile race in May by at least three cars, according to Finley R. Porter, president of the company. As announced in Motor Age last week, it is the intention of the com-

pany to compete in all important events of the year. Mr. Porter states that the announcement of the intended move of the company to Indianapolis was a misunderstanding, as the factory will continue to be located at Port Jefferson, where he will turn out the cars.

BRISCOE ADDS TO PLANT

Detroit, Mich., Feb. 3—Special telegram—The Briscoe Motor Co. has leased for 1 year the old knitting plant in Jackson, Mich., with privilege of purchasing it. The Briscoe company will use this plant for motor assembling, painting and trimming and thus will give employment to about 300 more men.

ST. LOUIS TRIES JITTERY BUSES

St. Louis, Jan. 29—This city now has its jitney bus, a line of eight motor buses making trips from Broadway to Grand avenue on Olive street. The trip, which requires about 22 minutes via street cars is being made in from 9 to 10 minutes with the motor vehicles. The venture has proven a success and the promoter announces next week or so will see nearly 100 of the little buses doing business on all the main streets in the city. At present the cars accommodate only twelve passengers and it is planned to install larger ones. The buses stop on the near crossings, the far, in the middle of blocks and in fact everywhere there are passengers.

JITTERY SERVICE FOR DETROIT

Detroit, Mich., Feb. 1—The Detroit Jittery Bus Co., the organization of which is only a day old, is to begin operations on a large scale beginning June, 1, when sixty-eight eight-passenger buses are to be in service. Buses will be operated as fast as they are ready, but the system will not be fully up to the layout until that day. W. G. Wagenhals, vice-president of the Wagenhals Motor Co., is the promotor.

For the present Wagenhals' idea is to confine the jitney service to only two of the most important local thoroughfares, Woodward and Jefferson avenue. On the former there will be fifty buses in operation and on the latter, eighteen, in each case half making the service one way while the other half is running in the opposite direction. The distance on Woodward avenue to be covered is 3 miles and the buses are to be operated in keeping 600 feet from each other.

The Fuller Co., manufacturing engineer, is planning to build and operate a jitney bus service with electric double-deck buses, seating sixty persons. They will be of the pay-as-you-enter street car model.

One of the biggest local garages also is planning the organization of a company to operate jitneys.

Moline 40 at \$1,475 Lowest-Priced Knight in America

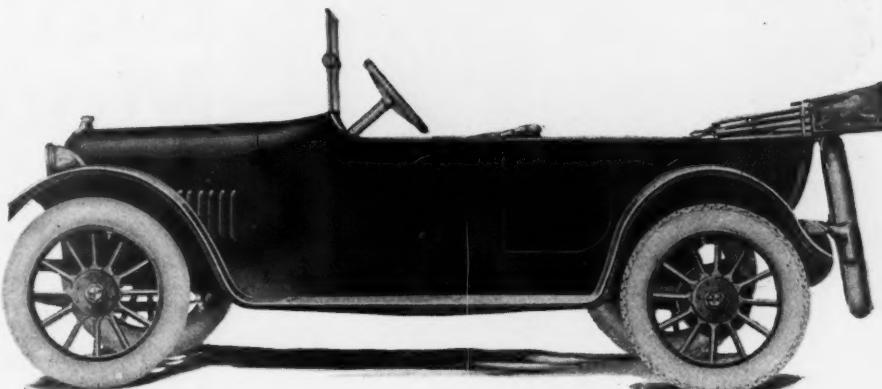
Block-Cast, Thermo-Syphon Cooled Motor, 3 1/2 by 5

THE Moline Automobile Co., Moline, Ill., has made known its plans to market a \$1,475 Moline-Knight, model 40, which is to be equipped with the four-cylinder motor exhibited last week at the Chicago show, and mounted on a 118-inch chassis. This announcement bears considerable importance since it marks the beginning of the medium-price Knight car, the new Moline having a list price much lower than any other similarly-engined car in this country.

Exterior Like Larger Car

Exteriorly the car is little different from the larger of this make and while the components are the same in fundamental design, there are slight differences in the detail. The motor is a 3½ by 5, cooled syphonically, and using Connecticut battery ignition. One individuality, which stamps it as an up-to-the-minute design, is the ignition wire carrier. The ignition distributor is on the left side and the wires therefrom run, up through the cylinder casting between the second and third cylinders and out at the top on the opposite side. Above the ignition distributor is the exhaust manifold which has a single opening for the clamping on of an exhaust pipe. This opening is at the rear, another example of uniqueness. Lubrication is by force feed through a hollow crankshaft.

In the springing the new Moline 40 shows a departure for cars of this type. The rear springs are of the double, semi-elliptic cross type. The gearset is a three-speed, the rear axle a floating with spiral bevel gears and the tires are 34 by 4. In the



Moline-Knight, a new 118-inch wheelbase car announced by the Moline Automobile Co., Moline, Ill. Its price is \$1,475, the lowest announced in this country for a car with a Knight motor

fittings are a two-unit cranking and lighting system, power tire pump, one-man top, horn, robe rail, tire irons, etc.

NOT A FRICTION ABSORBER

In the January 21 issue of Motor Age in the story on shock absorbers on page 65 it was stated the Connecticut is a friction type which is wrong, the absorber depending for its qualities upon spring action.

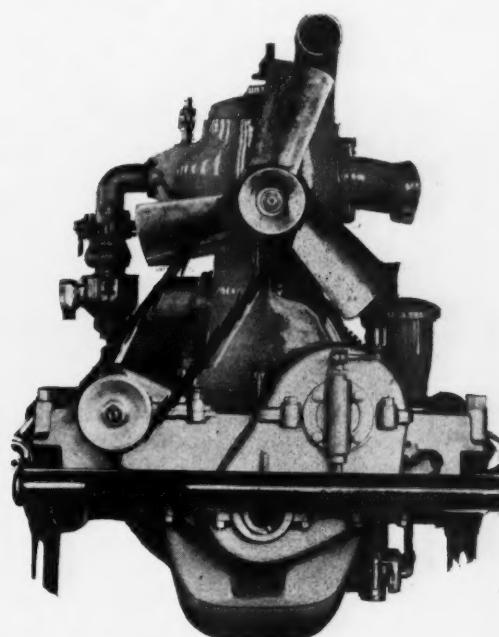
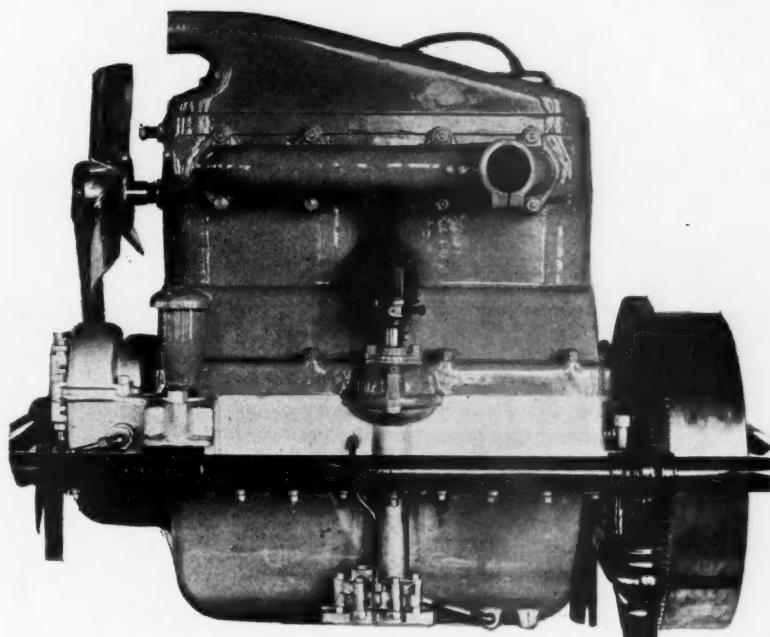
WRONG PRODUCTION FIGURES GIVEN

Motor Age desires to correct misstatements concerning the production of the Bosch Magneto Co. and the Corcoran Lamp Co., which appeared in its article, "Great Oaks from Little Acorns Grow," which appeared in the issue of January 21, and for which typographical errors were re-

sponsible. The Bosch factory at Stuttgart, Germany, has facilities for turning out 750,000 magnetos annually, instead of 75,000, while the Corcoran company manufactured 250,000 pairs of lamps last year, not 25,000. The published figures did not give due credit to the capabilities of these two concerns.

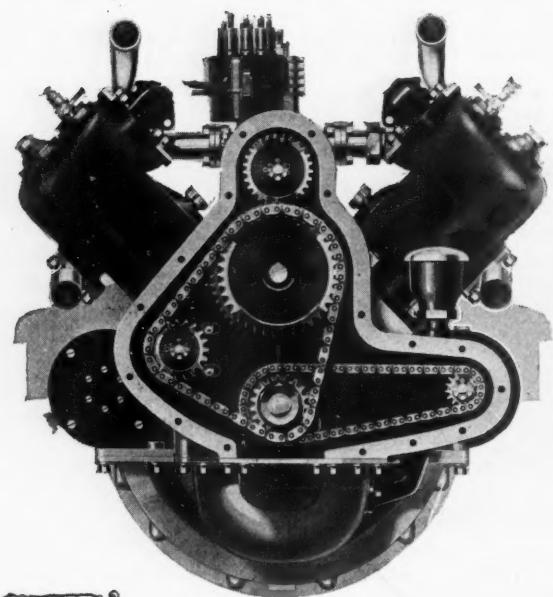
RECEIVER FOR IDEAL WHEEL

Indianapolis, Ind. Feb. 1—On action brought by Carter Jessup, a stockholder, E. A. Skinner, has been appointed receiver for the Ideal Steel Wheel Co., of Elkhart, Ind. In his application for receiver, Mr. Jessup says that pending litigation against the company probably would result disastrously for the company and that a receiver is necessary to conserve the assets and place the company on a sound basis.



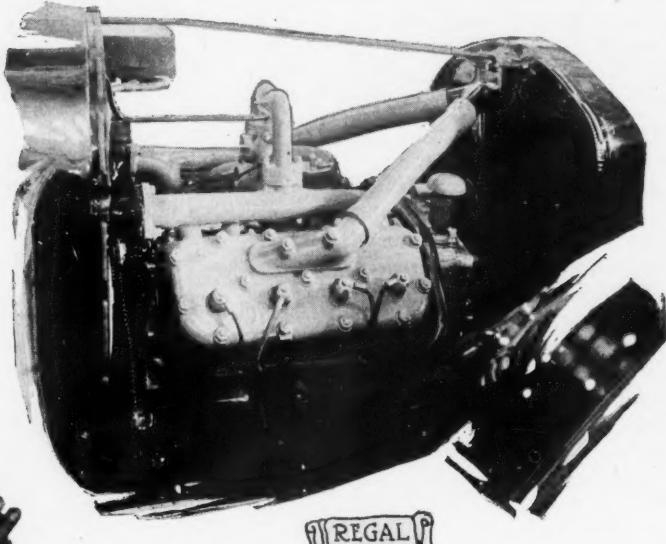
TWO VIEWS OF THE NEWLY-ANNOUNCED MOLINE-KNIGHT FOUR-CYLINDER MODEL 40

The left illustration shows the unusual exhaust manifold with one port for the attachment of the exhaust pipe. The ignition distributor has its wires leading upward through the cylinder casting to the opposite side. The oil pump also is shown in the illustration. At the right is a front view showing the odd carburetor connection, the fan drive and the inlet water manifold, which is to the right of the carburetor

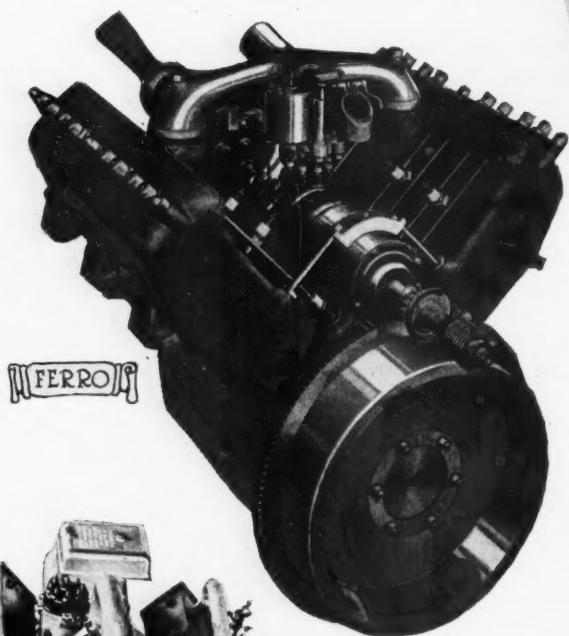


KING

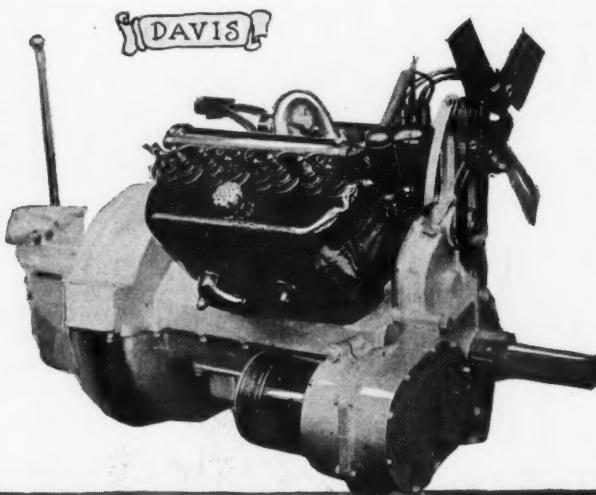
American • Eight-Cylinder Motors •



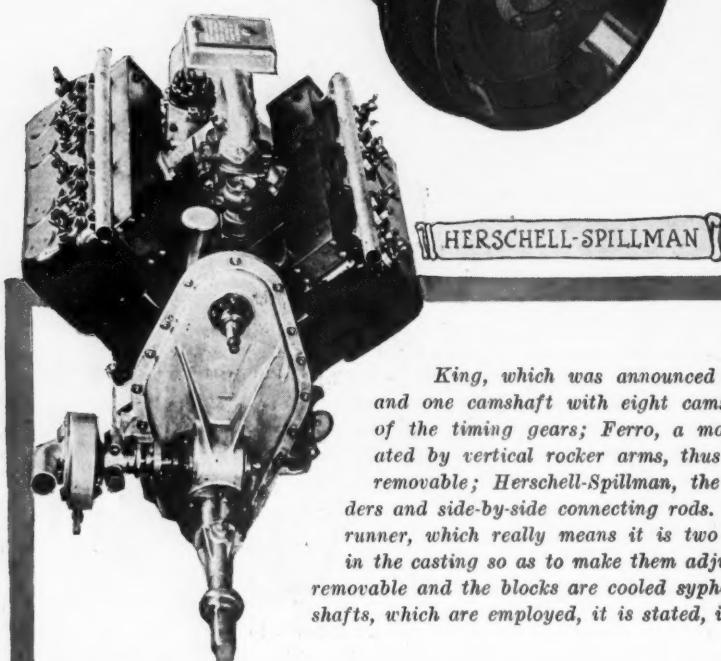
REGAL



FERRO

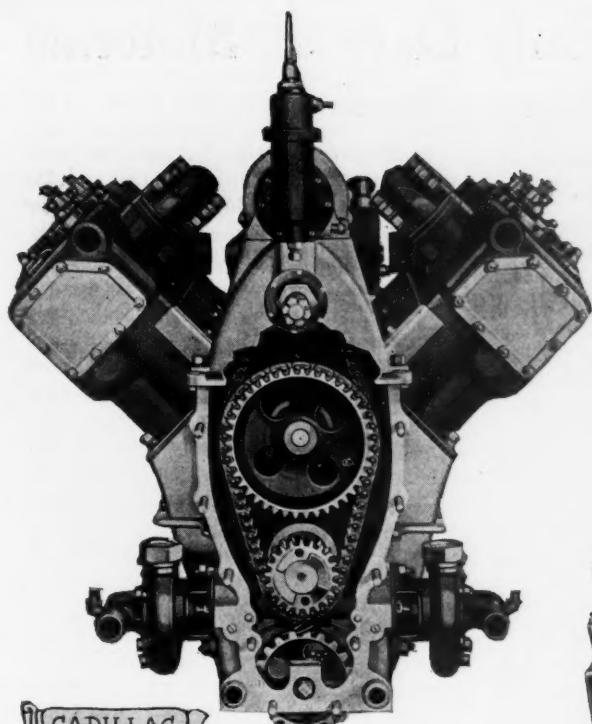


DAVIS

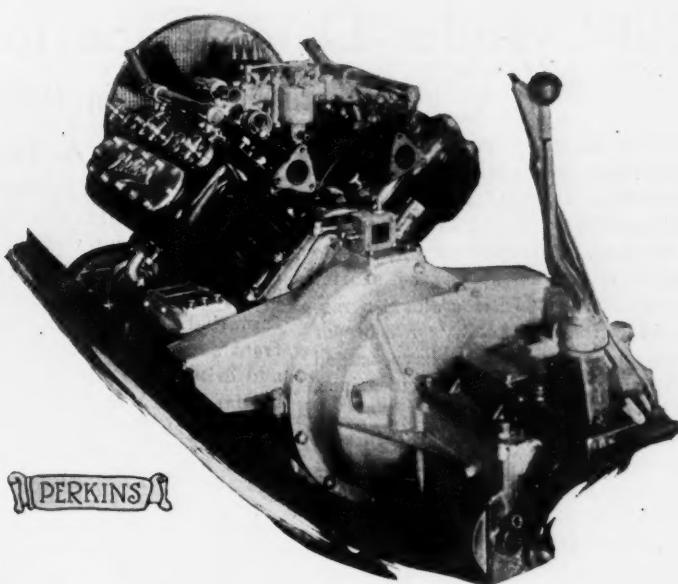


HERSCHELL-SPILLMAN

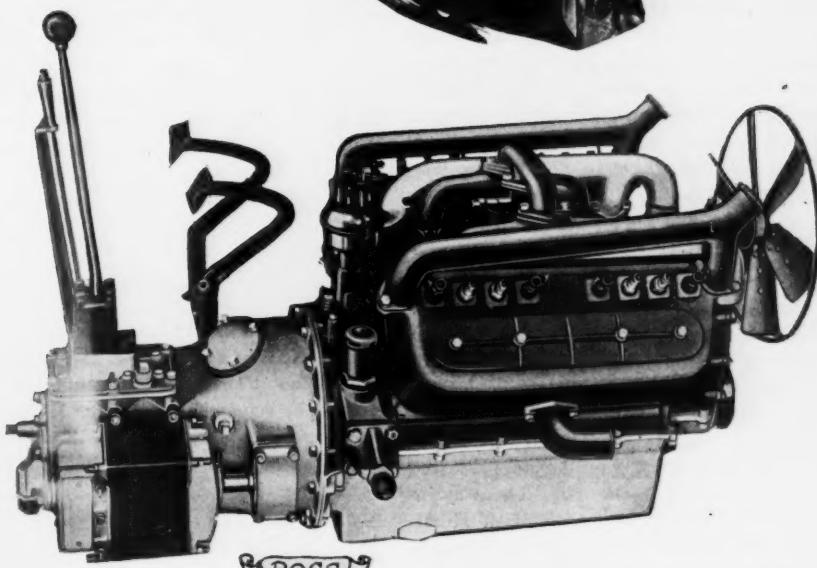
King, which was announced shortly after the Cadillac. It has yoked connecting rods and one camshaft with eight cams, each one operating two valve push rods. Note the drive of the timing gears; Ferro, a most novel type with the valves in the cylinder heads operated by vertical rocker arms, thus making valve adjustment easy. The cylinder heads are removable; Herschell-Spillman, the first type announced in America using staggered cylinders and side-by-side connecting rods. A single water pump is used but it contains a double runner, which really means it is two pumps in one; Regal, an eight using valves set diagonally in the casting so as to make them adjustable easily, at the stem ends. The cylinder heads are removable and the blocks are cooled sphonically; Davis, the only motor of its type using two cam-shafts, which are employed, it is stated, in order to obtain better valve timing.



CADILLAC



PERKINS

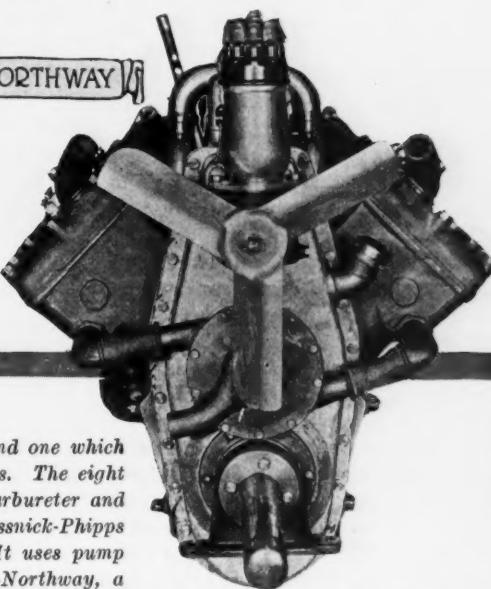


ROSS



BUDA

COLE-NORTHWAY



Cadillac, the announcement of which started a new eight-cylinder era and one which resulted in the actual production and marketing of eight-cylinder motor cars. The eight shown has two water pumps and a single camshaft with eight cams. One carburetor and a battery ignition distributor are used; Perkins, a motor made by the Massnick-Phipps Co., Detroit, and the first to be brought out by a builder of motors only. It uses pump circulation and is made in two sizes as shown in the table herewith; Cole-Northway, a motor made by the Northway company and used in the Cole car. It is featured with detachable cylinder heads for the blocks, so making carbon scraping easy. Note the location of the water pump directly back of one of the fan blades; Buda, a recent introduction using staggered cylinders offset 1 9/16 inch and side-by-side connecting rods; Ross, a thermo-syphon cooled eight with the water pipes tapping the cylinders at two points

Eight-Cylinder Dates Back to Early Days of Motoring

First Octuple Motor in 1902—Winton a Pioneer

YOU, who at the motor shows gazed with admiration upon the eight-cylinder engine and regarded it as a modern innovation, were wrong. The octuple motor is not new. For all we know, Apollo substituted it for horses on the chariot of the sun and it sent Charon's boat across the turgid waters of the Styx a score of centuries ago. Vulcan may have forged one. Mythology gives no specifications, but we have our suspicions.

At all events, the engineer of 1915 cannot claim credit for turning out the first eight-cylinder job. Octuple engines made their modest debut 13 years ago when two concerns, one American and the other French, introduced Brobdingnagian motors almost simultaneously. The year was 1902; the cars were the Winton and the C. G. V. The former was the handiwork of no other person than Alexander Winton, who first exhibited the machine in 1903 at the Gordon Bennett race, while the C. G. V. was made by the French firm of Charron, Girardot & Voight.

Winton a Unique Affair

The American Winton truly was unique and would be the cause of much comment if driven to the starting line in one of our modern races. Its eight cylinders were arranged in two sets of four each, placed horizontally across the center of the frame. The cylinder heads projected beyond the sides of the car. These cylinders were made of cast iron, with aluminum waterjackets and removable heads. The dimensions were 5 by 6 inches and the pistons drove a divided crankshaft which was coupled in the center. It used two centrifugal water pumps—one for each set of four cylinders—this practice now being followed by the Cadillac company in its motor.

The C. G. V. eight had vertical cylinders all in one row and that the advantages of the even torque and flexibility were then appreciated is evidenced by the fact the car did not have a gearset. The details now at hand regarding this engine are meager.

During 1903, while activity with eights was rather pronounced for that time, the Nilson-Miller Co., a Hoboken, N. J., concern manufacturing trucks, brought out a six-cylinder V-type motor and a four V-type. Little information is at hand as to what eventually became of these designs, but the four V-type was rejuvenated later by a number of concerns, notably the Marmon company. The Marmon V-type four was air-cooled and did not make its appearance until 1905.

During the period from 1903 to 1905 nothing seems to have been done with the eight, but early in 1905 two new ones were brought out, one in this country and another in England, again showing that the American engineer was thinking just as

By Harry A. Tarantous

progressively as his brother across the sea. The English eight was the Rolls-Royce. The American car was the Christie, built by Walter Christie for racing purposes. The latter was a unique affair built in V form, but the motor took the place of the front axle, the crankshaft taking the load and driving the wheels through the intermediary of slipping clutches. Christie first showed this car at a race meet held at Morris Park, New York.

Two-Mile a Minute Darracq

In the following year, 1906, while most of the American manufacturers were trying hard to get a four-cylinder to run a mile without trouble, three eights were brought out—the Hewitt, Darracq and Maxwell. The Hewitt was introduced by the Hewitt Motor Co., of New York, a concern then building trucks. It was a V-type motor and was short-lived in popularity. The Darracq made its way to this country from France and distinguished itself, at the hands of Victor M. Demogeot, by traveling 2 miles in 58½ seconds, the first car and driver in the world to cover 2 miles within a minute. This performance was made at Ormond Beach, at which time, it will be remembered, Victor Hemery was to drive the car, but got into difficulty with the officials and was disqualified.

At the time of the Vanderbilt in 1906, the Maxwell eight made its debut. It was built by the Maxwell-Briscoe company especially for the Vanderbilt, but it never started in the race and was forgotten afterwards. The Maxwell eight was virtually a double four-cylinder motor with an engine compartment and hood taking up about nine-tenths of the chassis length and leaving only room for a driver's seat.

It is claimed that in 1906 a man named H. H. Buffam, whose factory was at Abington, Mass., made and marketed a number of eight-cylinder cars fitted with V-type motors with separately-cast cylinders and a single inlet pipe and on exhaust.

In the lapse of time between these announcements and the year 1909, eights were forgotten, seemingly, but during the year 1909 the de Dion company of France first brought out an eight-cylinder V-type motor and has been building them ever since, at the present time being the only European builder of eights. In its 1915 line the concern is offering three eight-cylinder chassis, all of practically the same design, but of different cylinder dimensions.

The impressionistic eights were not the limit in so far as cylinder number was concerned, for during the hibernation period between 1909 and 1913, experimentation with twelve-cylinder motors was going on and the first outgrowth of this was the twelve-cylinder Sunbeam announced in the summer of 1913. This English-made car at once distinguished itself by traveling over 107 miles in 1 hour of continuous driving. The man at the wheel was Chassagne and his mad race around the track at Brooklands was for the purpose of breaking the 1-hour record of 103.84 miles held at that time by Percy Lambert, who drove a Talbot. He succeeded easily in beating this mark.

Details of Sunbeam Twelve

The twelve-cylinder Sunbeam is a V-type motor with four blocks of three-cylinders each. Two sets of three cylinders are placed on either side, making practically two six-cylinder motors arranged in V-form, a single camshaft lying in the crankcase between them. It employs two carburetors and two magnetos. The dimensions are 80 by 150 millimeters, or practically 3⅓ by 5⅔ inches.

During the development period of eights, American engineers evolved nothing of practical value; that is, no type was actually used in motor cars offered for sale in any quantity worth considering. But, as with many movements of this sort, there is a dead period and then suddenly a revival which usually makes itself strongly felt. This revival was begun in November, 1914, when the Cadillac com-

AMERICAN MAKERS AND USERS OF EIGHT-CYLINDER MOTORS

In the order of their announcement

Make	Price	Bore and Stroke	Displacement	Features
Cadillac	\$1,975	3.125x5.125	314.6	Thermostatic water control
King	1,350	2.750x5.000	237.5	Silent chain drive
Briggs-Detroit	1,295	2.750x4.500	213.9	Silent chain drive
Remington	1,495	3.125x4.500	276.1	Silent chain drive
Regal	1,250	2.875x4.500	233.7	Thermostatic cooling water control
Ross	1,350	3.000x4.500	254.4	Two water connections to cylinder
Cole	1,785	3.500x4.500	346.4	Removable cylinder heads
Abbott	1,685	3.125x4.500	276.1	Silent chain drive
Marion	1,250	3.500x4.500	346.4	Silent chain drive
Monitor	1,275	.....	.....	.....
Bailey-Klapp .....	.....	3.000x4.000	226.2	.....
*Perkins .....	.....	2.750x4.500	213.9	Two camshafts
*Perkins .....	.....	3.125x4.500	276.1	Silent chain drive
*Ferro .....	.....	3.251x4.000	265.4	Silent chain drive
*Ferro .....	.....	3.000x3.500	198.0	Overhead valves
*Herschell-Spillman .....	.....	3.000x5.000	282.0	Overhead valves
*Buda .....	.....	3.000x5.125	289.7	Staggered cylinder blocks
*Davis .....	.....	3.000x4.000	226.2	Staggered cylinder blocks

*Engines built by motor makers.

pany announced its eight-cylinder V-type motor, and met with such approval that in a decidedly short time other makers took up the eight, until now there are no fewer than ten manufacturers active in the field and more than six others making effort to bring to perfection plans already formulated.

Cadillac, the First High-Speed Type

Cadillac's eight is the first one in America to be of practical value and the first engine which really falls in the class commonly referred to as high-speed.

The King company's announcement of an eight followed closely that of the Cadillac, but the motors, which are shown on the following pages, while they showed some resemblance in general, differ greatly in some of the details. The illustrations bring one of these differences out very forcefully, that of the front-end gears. Both of these engines employ cylinder blocks of four each placed opposite one another and connecting rods of the yoked type.

Following the King eight came that of the Briggs-Detroiter which is fitted with a Perkins motor. This engine is made by the Massnick-Phipps Co., Detroit, and is now in use by a number of other car manufacturers. It shows nothing unconventional in eight-cylinder construction, using L-head cylinder blocks and a single camshaft with eight cams. The Remington eight made its appearance at almost the same time that the Briggs was announced and this was followed by the Regal and Ross. The Cole, Abbott and Marion then followed. Of the three, the Cole uses a motor which differs slightly from the rest. It is a Northway engine with detachable cylinder heads.

The succession of announcements by motor car builders kept the motor specialists rather busy perfecting marketable

eight-cylinder motors. The Massnick-Phipps company was first in the field and now is supplying four of the car builders.

In every instance so far mentioned, the cylinders are of the L-head type with the valves on the inside in the V. This caused much comment by the public concerning valve tappet adjustment, valve grinding, etc. The Ferro Machine and Foundry Co., Cleveland, O., startled the enthusiasts with a new type of eight-cylinder motor, a valve-in-the-head, which is designed to overcome all the objections in the matters above mentioned.

That experimentation had been going on at a lively rate was evident from the next announcement made, that of the Herschell-Spillman Co., whose eight has side-by-side connecting rods and staggered cylinders. Only a few days later the Buda company, Harvey, Ill., brought out a similar type of engine and at the time of the Chicago show the Davis motor made its initial appearance. The startling feature of the Davis motor is its use of two camshafts, while all the other eights use but one.

Within the past week two additional eights have been brought out, one made by the Columbus Auto Sales Co., Columbus, O., called the Monitor and the other the Bailey-Klapp, made by the Elwood Iron Works, Elwood, Ind.

Error in Motor Captions

In the illustrations of the new motors in Motor Age, issue of January 28, a transposition of cut lines on pages 26 and 28 occurred, the view of the Cole motor being captioned the Davis; the illustration of the Ross was called the Cole, and the Davis motor being labeled the Ross. Other illustrations of these motors are given on these pages with the proper captions.

Goodrich Reports on Year's Business

Earnings of 5.65 Per Cent on Common Stock

AKRON, O., Feb. 1—Earnings of 5.65 per cent on \$60,000,000 common stock, as compared with 0.83 per cent in 1913 on the same stock, and the retirement of \$900,000 preferred, is the showing made by the B. F. Goodrich Co. in 1914, according to its preliminary statement. After making provision for all maintenance charges, depreciation, bad debts and outstanding liabilities, etc., the net profits for the period amount to approximately \$5,440,000. This amount added to the surplus carried over as at December 31, 1913, of \$705,900, shows undivided profits of approximately \$3,177,400, after deducting the four quarterly dividends of 1½ per cent on preferred stock outstanding, together with a provision of \$900,000 July 1, 1914, for the redemption of preferred stock as called for by the articles of incorporation.

The company's financial position has again been materially strengthened during the past year, as the amount of quick

assets over current liabilities shows a gain over last year of approximately \$2,950,000. The contingent liability in respect of bankers' loans, and which existed at December 31, 1913, has been liquidated.

According to the statement, the company has on hand cash to the amount of \$4,175,000 and has no bills payable outstanding. The current assets amount to approximately \$20,300,000, and the current liabilities to \$1,470,000. There is no funded debt.

At the regular quarterly meeting of the directors held on January 27 there was retired, subject to the approval of the stockholders, 11,000 shares of preferred stock which, together with the 9,000 shares appropriated at the July meeting of the board, makes a total retirement of 20,000 shares.

REPUBLIC TO ISSUE NEW STOCK

Youngstown, O., Jan. 29—Approval was voiced at the annual meeting of the stock-

holders of the Republic Rubber Co., this city, on a preferred stock issue of \$3,000,000. Formal action will not be taken until a special meeting to be called in February. Of the proposed issue but \$2,500,000 will be required to replace stock of this character yet outstanding, which matured September 1, 1914. The remainder will be available for plant extensions contemplated as business warrants.

The former board of directors and its officers were re-elected. Members of the board are: T. L. Robinson, L. T. Peterson, J. H. Kelly, A. H. Harris, M. I. Arms, John Tod, David Tod, J. C. Wick, Robert Bentley, and H. K. Wick. Officers are: President, T. L. Robinson; first vice-president and sales manager, J. H. Kelly; secretary, C. F. Garrison, and treasurer, M. I. Arms.

U. S. RUBBER IMPORTS IN 1914

New York, Feb. 1—The United States commerce in crude rubber and scrap rubber for 1914, amounted to imports of 186,302,780 pounds. Of this amount, the Indian rubber exports amounted to 143,065,161 pounds. Scrap rubber amounted to 19,133,966 pounds. Rubber from Balata, Guayule, Pontianak, amounted respectively to 2,015,158, 2,275,540 and 17,889,817 pounds.

The rubber exports amounted in 1914 to 6,415,339 pounds. Again Indian rubber leads with 5,800,870 pounds. The exports to Balata amounted to 565,150 pounds. The scrap rubber exports amounted to 40,426 pounds.

From December 29 to January 22, a total of 6,558,100 pounds of crude rubber arrived in this city. The biggest shipment was made on January 15, where the steamer Boniface from Para and Manaos landed with 2,486,400 pounds of rubber on board the vessel.

Another large shipment from the same places arrived on December 29, amounting to 1,930,300 pounds.

FISK REPORTS YEAR'S PROFITS

Chicopee Falls, Mass., Jan. 29—The fiscal report of the Fisk Rubber Co., this city, which ended October 31, 1914, shows an increase in net profits of \$336,204 over 1913, the net profits of the company for 1914 being \$942,204.

The surplus for 1914 shows an increase of \$229,725, the 1913 surplus being \$285,833 and the 1914 surplus being \$350,000. The 1913 surplus includes a \$42,777 dividend on the preferred stock of the Fisk Rubber Co., of Delaware. Out of the net profits made in the fiscal year 1914 there were retired on December 31, 2,250 shares of first preferred stock, according to the provisions governing the issue and retirement of this stock. The income statement for 1914 with 1913 of the Fisk company is compared as follows:

	1914	1913
Net profits	\$942,204	\$606,000
Inventory reserve.....	160,000	117,688
Balance	782,204	488,312
Preferred dividends.....	350,000	285,833
Surplus for year.....	432,204	202,479



The Readers' Clearing House



"COME WEST, IT'S SAFE," HE SAYS

**Carson W. Smith Replies to R. J. Miller
on Safety of the Lincoln Highway**

DACONA, Col.—Editor Motor Age—I noticed with extreme interest a few weeks ago a letter from Robert J. Miller in a recent issue of this magazine, inquiring about the safety of the Lincoln highway in the western states for eastern tourists, who in this letter tentatively suggested that here might be a profitable means of employing the many sturdy soldiers in the western forts, who at present are unoccupied during the present lull in wild Indian uprisings.

With added interest I have read his letter in your issue of January 21, and as I feel that Mr. Miller is seriously considering making this trip this summer to the coast through this vast unsettled west, while my knowledge of the vast expanses of the Rocky mountain region is not exhaustive, I have been compelled at times to make excursions into its different parts, and I wish to advise Mr. Miller that from my observations I believe it would be quite safe for him, even with his family, to traverse this portion of the rugged west.

In all my trips I never have been menaced seriously by wild beast or man. The native westerner is generally of a gentle nature, unless aroused; but with tact and courtesy I have always found myself able to control him. While ready with six-shooter, or knife, yet underneath his apparent uncouthness and savagery lurks the true gentleness of the grand old pioneer stock.

Of the fiercer omnivorous wild beasts, I am happy to say that the main trails and passes are fairly free. Nor even on the lesser routes have I yet had to mix it with the terrible Silver Tip and mountain lion. Of rabbits, chipmunks, and prairie dogs, there are indeed many that still infest the land, but it has been my observation that invariably these all flee in terror at the approach of man.

I have been in Colorado, and Utah, and Wyoming, and New Mexico, and whether Mr. Miller chooses, north or south, I can safely say, "Come, Come! Bring your friends, your dogs and other pets. The West is safe!"—Carson W. Smith.

DROVE 3,229 MILES THROUGH WEST
**Reader States His Family Slept Outdoors
and Was Unmolested During Tour**

Meadville, Mo.—Editor Motor Age—In reply to Mr. Miller's question on transcontinental touring, I will say that on June 16, 1913, having spent the winter in southern California, where I had purchased a 1913 Reo, I started for Mead-

ville, Mo., with my wife and two children.

We carried 1,000 pounds of baggage, including a tent, camp stove and cover for car. We went up the coast as far north as San Francisco, then across to Stockton, Sacramento, Carson City, Reno, Ely and then to Salt Lake via Kearney's Ranch, following the Midland trail. From Salt Lake we went up into Wyoming and on to Laramie, thence south to Denver and Colorado Springs, where we arrived July 12th; having spent each night in the open. We never were questioned nor molested in any way.

After spending a week or so in and around the Springs, we came on home, arriving July 27th.

This car was driven and taken care of by my 16-year-old son, the entire distance of 3,229 miles. With the exception of tire troubles we came through in fine shape and the car is none the worse for the trip. As for water, a 5-gallon water bag is sufficient on that route to last from one place to another.—Willis Friesner.

INJECTING "PEP" INTO A USED CAR
**Suggested Methods for Getting More
Power from the Motor**

Monrovia, Cal.—Editor Motor Age—What is meant by the expression, porting the cylinders?

2—In converting a Ford runabout into a racer, is a gain in power and speed obtainable by altering the timing of the valves and by increasing the valve lift? If worth while, just what changes in this line does Motor Age suggest, and to what extent? In carrying out such a plan is it necessary to have a special camshaft made, or can the old camshaft be altered by welding on additional metal? If a new shaft is needed, where may it be obtained; or if unnecessary, where may the old shaft be altered, and what would be the approximate cost of such changes?

3—Would larger valves be a further help, and is the use of larger valves on the Ford practical; in enlarging the valve seats is there not danger of cutting into the water-passages? If the enlargement is possible or desirable, what size valve does Motor Age recommend and where can the larger valves be obtained?

4—Assuming the advisability of changing the valve-timing and lift, and of using larger valves, would it then be necessary or desirable to put on larger inlet and exhaust pipes; and if advisable, how large should the pipes be?

Questions Answered and Communications Received

Carson W. Smith.....	Dacona, Col.
Willis Friesner.....	Meadville, Mo.
Charles E. Atkinson.....	Monrovia, Cal.
Elmer Whitehead.....	New Paris, Ind.
William F. Brillard.....	Gaylord, Minn.
E. N. Dryer.....	Champaign, Ill.
J. B. McQueeny.....	Chicago
L. L. Medbery.....	Dexter, Minn.
B. D. Hungerford.....	Canton, Kan.
A Reader.....	Chicago
E. J. Welch.....	Galesburg, Ill.
A Reader.....	Chicago
A. C. Vickery.....	Watonga, Okla.
A. J. Adams.....	St. Louis, Mo.
D. J. Kerger.....	St. Anne, Ill.
G. A. Schmitt.....	Elgin, Ill.
D. J. W. Tibbits.....	DeQueen, Ark.
George J. Scoblic.....	E. St. Louis, Ill.

No communication not signed with the reader's full name and address will be answered.

5—Can the cylinders safely be bored out for the installation of larger pistons; and if safe, how much metal should be removed?

6—Is a gain made by applying plates on the tops of the pistons? Is this safe; and if so, how thick should the plates be?

7—Would the installation of a new crankshaft having a greater throw—thereby increasing the compression and the piston-stroke—be possible; and would this be better than simply applying plates to the piston tops? Would a greater crank-throw necessitate putting a new base on the crankcase? Where could such a crankshaft be obtained and what would be the approximate cost?

8—What changes in the lubrication of the car are needed for high-speed work?—Chas. E. Atkinson.

1—Porting refers to practice used in racing cars for allowing the exhaust gas to rush from the cylinder directly to the air.

2—It is possible to get additional motor speed by altering the present shaft or by substituting a new one of different design. It hardly would pay to have additional metal welded to the cams and the latter then cut to size. Motor Age suggests that you have a new camshaft made by the local machinist giving the valves a slightly greater lift and having the cams designed with a larger base circle so that the valves will open and close quicker. Also the exhaust cams can be flattened a little more. A fairly good valve timing reads as follows: Inlet opens 5 degrees after top center and closes 50 degrees past bottom center; exhaust opens 42 degrees before bottom and closes 5 degrees after top center. This timing may be compared with the regular Ford timing which reads: Inlet opens 12 degrees past top center and closes 50 degrees past bottom center; exhaust opens 37 degrees before bottom and closes on top center. The figures given above are merely suggested ones and you may be able to work out a better set by experiment.

3—The use of larger valves would help in obtaining more power but in the Ford there is not much metal between valve seats. It appears they can be enlarged $\frac{1}{2}$ -inch or perhaps slightly more. The seats are enlarged by counterboring. Larger valves may be obtained of any of the following valve makers: Electric Welding Products Co., Cleveland, O., Michigan Engine Valve Co., Detroit, Mich., Lewis Electric Welding & Mfg. Co., Toledo, O.

4—You would not get much better results by using larger manifolds.

5—Little metal can be removed from the cylinders in order to use larger pistons. Reboring is done by thousandths of an inch and you should not attempt to remove too much metal.

6—This is poor practice. In a fast motor the plates soon would give trouble. If you insist upon decreasing the size of the combustion chamber, installing longer pistons would be preferable to using plates.

7—While it is possible to use a shaft giving a 4½-inch stroke the reconstruction is not advised.

8—A pressure system with leads directly to the bearings in conjunction with splash for the pistons and cylinders, etc., would be desirable. Many who have converted their Ford into a speed car have had good results without any changes in the lubricating system.

STANDARDIZE TRACK OF CUTTERS Says Narrow Tread of Sleighs Interferes with Motor Car Traffic

New Paris, Ind.—Editor Motor Age—I am very much interested in the efforts which have been made in some places towards standardizing the sleigh and cutter tracks, and am confident that it will greatly benefit the motor car industry as well as individuals who own cars.

I have driven cars in my business for a number of years and have been made to feel more keenly each winter what a great inconvenience every user of the highway is subjected to by the extreme narrow track of sleighs. I am compelled to lay up my car for a great part of each winter just when we have the most use for it, due to the roads which are broken by sleighs being too narrow to admit the wheels of a motor car.

Drivers of horse-drawn vehicles suffer as much from this cause as do the motor cars. Rural mail carriers would be greatly benefited, as they are now compelled to go from their cozy closed car or wagon to breast the blizzard in an open cutter as they are prevented from transferring the light closed body to a pair of runners, because of the danger of upsetting, with the narrow track. With the wide track sleigh the body could readily be transferred to a pair of runners and used with less danger of accident than the wagon, due to low position, etc.

It is my opinion that an appeal made to the proper authorities by the Rural Carriers' Association and the Good Roads Commission, would have more influence than from any other source.—Elmer Whitehead.

WHEN IS A BATTERY DISCHARGED? When the Gravity of the Solution Drops to 1.150—Other Questions

Gaylord, Minn.—Editor Motor Age—How can one ascertain when a storage battery is fully charged?

2—When discharged.

3—When adding electrolyte to a storage battery, should it be done when the battery is discharged, and if so how can one tell when the proper amount has been added. As I understand it a storage battery should not be tested when fully charged—I have in mind the acid test.

4—What voltage should a standard 6-volt storage battery test when fully charged and when discharged?

5—Suppose a car traveling at a high rate of speed is equipped with a storage battery and a magneto, the normal output of which is 6 amperes, what would the charging side of amperage meters register when the battery is fully charged?—William F. Briard.

1—By testing the solution with a hydrometer. When fully charged the solution will show a gravity reading of between 1.280 and 1.300 on the Baumé scale.

2—A battery is said to be discharged when its gravity has dropped to 1.150 or under.

3—Distilled water should be added before the battery is placed on charge. The solution should cover the plates. In some batteries the level is ½-inch higher than the tops of the plates.

A battery can be tested at any time and obviously the only way to tell whether it is fully charged or not is to test it in some way, the gravity method being used usually.

4—When fully charged about 7 volts is the reading usually obtained. Each cell should test about 2.5 volts. This will vary with the size of the cells, etc. When the voltage drops below 2 volts per cell the battery is discharged.

5—In the first place the magneto could not be used for battery charging, because it generates alternating and not direct current. If the ammeter is placed in series with the charging line the registration will be according to the charging current which, when it falls to zero, will cause the meter to register zero.

INTERESTED IN RACING VEHICLES Thinking of Converting American Under-slung Into Speed Car

Champaign, Ill.—Editor Motor Age—What is the valve and ignition timing in degrees of most racing cars?

2—If the wheels of an American underslung were reduced from 40 to 34 inches, would the clearance be great enough for road and track racing?

3—Kindly give the name of a good wire wheel for racing purposes and the price per wheel.

4—Would it be advisable to use a patented piston ring in the top groove in a racing car, or the ordinary ring?

5—Could a large size American 5 by 6-inch motor be made fast enough for racing purposes, providing all the latest methods are used for getting the speed out of the car?

6—Are such mixtures as gasoline and ether or other mixtures of the fuel permitted to be used in races? If so, what are some of the mixtures?

7—Must a motor be built especially to use castor oil or can it be used in any racing motor?

8—Could new cylinders and pistons be cast for an American motor in 4 by 6-inch size and fitted and used with success?

9—How does a mechanic usually get on a racing team?

10—Are the entry fees returned to the entrant if the car starts in the race at Elgin?

11—When a Bosch double firing magneto is used, is the battery used to start?

12—Does the Duesenberg company make its own racing bodies? If not, who does?—E. N. Dryer.

1—It is safe to assume that no two racing cars are timed alike. If you will name a car Motor Age will attempt to get the valve timing for you.

2—The clearance would hardly be sufficient.

3—Write to the following makers of wire wheels for prices: Houk Mfg. Co., Buffalo, N. Y.; Standard Roller Bearing Co., Philadelphia, Pa.; Mott Wheel Works, Utica, N. Y.; Dunlop Wire Wheel Corp., New York; Kelsey Wheel Co., Detroit, Mich.; Great Western Mfg. Co., Laporte, Ind.

4—The difference in results from the ordinary ring hardly would be noticeable.

5—There is no reason why the motor could not be tuned to make it fit for some minor racing work.

6—Castor oil is used in a motor when

the piston-to-cylinder clearance is rather large. Any racing motor can use castor oil.

7—The use of such substances as ether and picric acid is not allowed.

8—New cylinders and pistons could be cast but the cost for one set would be exceedingly high. You can get a new cylinder block from the American Motor Parts Co., Indianapolis, Ind.

9—He applies to the manager of the racing team or to one of the drivers.

10—Yes.

11—Not usually.

12—What little there is of the body is made by F. E. Duesenberg.

USERS OF BALL-BEARING SHAFTS No Car in America with This Type for Connecting Rods

Chicago—Editor Motor Age—I have of late read much of the advantages of having modern high-speed four-cycle engines fitted with ball-bearings for the crankshaft. But would not the superiority of ball bearings over plain bearings be even more pronounced when used with the high-speed two-cycle engine having the lubricant mixed with the gas? That is, is there not even more justification for the use of ball bearings with such an engine than with the four-cycle engine? Or is it that the slightly higher cast of ball-bearings has militated against the use of ball bearings with the low-priced two-cycle engine?

2—Are there any motor car engines or other high-speed engines which use ball bearings between the connecting rod and the crankpins as well as for the crankshaft bearings proper? Kindly give some examples.

3—Several months ago I read an advertisement of the Ives cyclecar motor. The fact of its having internal balanced flywheels weighing 38 pounds was strongly featured in said advertisement. Do all cyclecar motors have flywheels, internal or external, or do many of them depend very largely or even entirely upon the driving disk of the friction transmission for flywheel effect?

4—Would it be practicable to dispense with the engine flywheel of the Cartercar?

5—In answer to inquiries regarding hand and automatic spark control, Motor Age states that the automatic is best for unskilled drivers, but that the expert can obtain better results by hand control. I presume that the magneto form of ignition is meant, for is it not true that even the expert can gain little if any advantage by changing from automatic to hand control in a battery ignition system.—J. B. McQueeney.

1—Ball bearings for the crankshaft are used mostly in two-bearing shafts. The use of these bearings allows of a reduction of overall length of the motor and also results in an easier running engine because of the reduced frictional losses. Two-cycle practice no longer is used for passenger car work except perhaps by some unimportant makers of small cars. Lubrication difficulties do not come up with ball bearing in this way, most of the trouble coming from the use of bearings of too small a size.

3—The cyclecar practically has passed for the crankshaft are: Detroiter model C, Herreshoff, Krit and White model 30. There are no American cars using ball bearings on the rods.

3—The cyclecar has practically passed from the field and has been supplanted by what is called the light car, every one of which uses a flywheel.

4—No.

5—It does not matter whether the source of current is a magneto or storage battery. A skilled driver might get better results with a hand control of the spark than can be obtained with the automatic control, as

stated in Motor Age for the reason that grade climbing can be accomplished much easier and the loads of the motor considered.

SUGGESTS ONE-CYCLE GAS ENGINE

Idea Has Been Tried—Asks About Eight-Cylinder Rotary-Valve Type

St. Anne, Ill.—Editor Motor Age—Could an eight-cylinder, rotary motor be built with stationary cylinders cast at an angle of 90 degrees?

2—Is there a possibility of an engine which would fire at both ends of the piston?

3—Is $\frac{1}{8}$ of an inch too much play in the wristpin bushing?

4—Is there any advantage in having the connecting rod bearings riveted to the connecting rod?

5—Would motor Age advise using shellac on rims to prevent rusting?

6—Has the 1, 2, 4, 3, system of timing any advantage on the 1, 3, 4, 2 system?—D. J. Kerger.

1—Your question is confusing. A rotary motor is one whose cylinder revolves and hence a rotary motor with stationary cylinders is an impossible type. Perhaps you have in mind a rotary valve motor. One of this type may be built in V-form.

2—This has been suggested by a number of inventors, but nothing practical has ever been produced.

3—The play is entirely too much. There should be so little play that it cannot be felt by movement of the wrist pin. This refers to up-and-down play.

4—The bearing must be prevented from turning in some way, but riveting would not be much better than the method generally used.

5—Shellac would peel off in a short while. Use graphite paint or ordinary paint.

6—They give the same results.

SIXES AND FOURS IN V-FORM?

Such Types Have Been Tried Many Years Ago—Rotary Valve Motors

Galesburg, Ill.—Editor Motor Age—Most of the eight-cylinder motors are of the V-type. Can engines of this style be made in four and six-cylinder form? They claim a six has too much whip or lash of the cam, and crankshafts. Can this not be overcome by in block motor and more main bearings.

2—A V-type motor is set at an angle of 90 degrees. Would a motor with the cylinders set at an angle of 180 degrees run smoother than the former, reducing the side thrust in the V-type on the cylinder walls.

3—Why is it that manufacturers do not use a valve in the head motor if it is more powerful and less expensive to manufacture?

4—What is the highest number of revolutions per minute a poppet valve motor has ever been run?

5—Is it true a rotary valve motor will turn over 5,000 r. p. m.?

6—Has an official test ever been made of this type of motor?

7—Is there any manufacturer thinking of adopting this motor?

8—Weight reduction is a great talking point at the present time. Are steel cylinders much more expensive than cast iron cylinders?

9—Why do not more manufacturers use two spark plugs in each cylinder firing at once like on the Mercer racing cars?

10—Will an eight-cylinder, V-type motor run smoother than an eight-cylinder with the cylinders cast in a single row, providing there is no whip or twisting in the cam or crankshafts?

11—Does an eight-cylinder, V-type motor need as heavy a flywheel as a four-cylinder motor, both being of the same horsepower?

12—Does an eight-cylinder, V-type motor need as heavy a flywheel as an eight-cylinder with the cylinders in a single row?

13—Does a cantilever spring lower the body, or bring the center of gravity closer to the ground?—E. J. Welch.

1—Four and six-cylinder motors can be made in V-form. They have been built and you can get some historical informa-

tion by reading the story on eight-cylinder motors in this issue.

The shaft whipping is overcome by using a heavy shaft or one with many bearings.

2—It would not run any smoother nor would it reduce the connecting rod angularity. The latter is overcome to a great extent by using a longer rod.

3—Valve-in-the-head motors are not necessarily lower in cost than an L-head or T-head. The makers of L-head and T-head motors use their particular types because of certain objections found in the valve-in-the-head.

4—Motor Age has no records pertaining to motor speeds but a safe figure would be 4,500 r.p.m.

5—Motor Age never has heard of a rotary valve motor turning over at 5,000 r.p.m.

6—Not in this country.

7—A rotary valve motor is used by the Speedwell company in its cars. It is the only car in this country using this type.

8—Steel cylinders are more expensive than cast-iron ones, and they are much more difficult to make. Steel cylinders have been used in many racing cars and in aeroplane motors.

9—The use of two spark plugs firing at once will necessitate the use of a double-distributor magneto and a cylinder which will permit of two sets of plugs being inserted. The two plugs of one cylinder must be opposite one another and hence in a T-head motor this is accomplished easily. In a valve-in-the-head and L-head types it is not so easily done. The use of two sets of plugs, while it gives a little more power would cause wiring complications and the modern owner has enough to do to understand the ordinary system and trace trouble.

10—The eight-cylinder motor with all the cylinders in a row would not run as smooth as the V type after being used for some time. When new there would be little noticeable difference.

11—The eight-cylinder uses a lighter flywheel than the four.

12—There should be no difference in the flywheel weights between the two.

13—It may or may not, depending upon the previous type of spring suspension. Some semi-elliptic designs will give just as low a suspension as the cantilever.

Rolls-Royce Uses Torsion Tube

Chicago, Ill.—Editor Motor Age—Can Hotchkiss drive be adopted when cantilever rear springs are used?

2—What is the speed of the Franklin model 30?

3—Does the Bosch Magneto Co. make a magneto with an automatic spark advance? If so, is it a stock model?

4—How is the drive taken on the Rolls Royce car?

5—What is the wheelbase of this car?

6—Is the automatic spark advance gaining in this country?

7—Kindly give illustration showing the cantilever rear springs used on the Rolls Royce car.—A Reader.

1—The 1915 National drives through the cantilever rear springs.

2—About 55 miles per hour if properly handled.

3—No.

4—Through a torsion tube.

5—The wheelbase is 143½ inches.

6—Yes, because of the greater use of many of the battery ignition systems so equipped.

7—This is not obtainable.

PECULIAR AILMENT OF A MAGNETO

Old Style Bosch Instrument Not Seriously Damaged—Repair Easy to Make

Canton, Kan.—Editor Motor Age—We have been having trouble with a Bosch magneto DU4 on a Stoddard-Dayton. Will Motor Age kindly suggest the cause of the trouble and a remedy.

The motor is in fine condition and works perfectly on batteries, but has begun to misfire on the magneto and will not fire with the spark retarded, except poorly, when idle. If the gas is opened it will choke like a faulty carburetor adjustment, but works perfectly with the batteries. Thinking the trouble was with the points, new ones were put in. They were adjusted closer, and farther apart, which had no effect.

When the missfiring occurs the spark jumps the gap in the back of the magneto. The distributor has been examined.

The car was taken to another repair shop but since then it will not run on the magneto at all except when a piece of paper is slipped in between the spring holding the lid on the breaker box and the lid insulating the spring on the outside from the one on the inside. The switch and coil have been examined as much as is possible without tearing them to pieces, but nothing can be seen.

When the spark lever is advanced about half way, the firing is better, and best when fully advanced. Sometimes it will stop entirely and when turned to the batteries always takes hold and runs perfectly.

If the Bosch people have a service station in Kansas City kindly give the name and address. If not, kindly give the address of the nearest station.—B. D. Hungerford.

1—In the magneto you have, which evidently is one of the old type DU4, the spring post is insulated and the breaking down of the insulator might cause the action of which you speak. Motor Age suggests you take the magneto to the Kansas City Automobile Supply Co., Kansas City, Mo., and have them replace the old spring post, spring and interrupter cover with the latest type, which uses a non-insulated post.

CANTILEVER SPRING ADVANTAGES

Easy Riding and Check Rebound—Cost More Than Semi-Elliptic

Chicago, Ill.—Editor Motor Age—What is the advantage or disadvantage of the cantilever spring in regards to the three-quarter and elliptic? Are the cantilevers cheaper to manufacture?

Is it necessary to increase the strength of the torsion rods by using this type of spring? I assume that they ride on a pivot in the center secured firmly to the rear axle and connected to a shackle in the other end.—A Reader.

The main advantage of the cantilever spring over the three-quarter elliptic is that it will give the same carrying capacity with the proper flexibility with considerably less weight. Another advantage lies in its slow period of vibration and the ability to eliminate rebound to a great extent. The weight of a cantilever is nearly all unsprung weight.

In the disadvantages the principal one is that a stiff frame is necessary and that a roll is given to the body when the car turns corners.

The cantilever costs more than the semi-

elliptic and about the same or slightly less than the three-quarter elliptic, considering fittings, etc.

It is not necessary to increase the strength of the torsion rods.

QUESTION ON TIMING OF VALVES

No Formula for Finding Best Figures for Certain Motors

St. Louis, Mo.—Editor Motor Age—Is there any formula by which one can figure out the setting and timing of the valves on any gasoline motor?

2—How can one tell when a magneto needs remagnetizing?

3—Kindly give the formula for finding the brake horsepower and motor horsepower of any motor.—A. J. Adams.

1—There is no formula by which one may calculate the valve timing best suited for any particular motor. By experiment it may easily be determined which setting is best.

2—When the magnets will not lift and hold about 15 pounds they are said to be weak. Misfiring at low speeds is a result of weak magnets.

3—The brake horsepower of a motor is that power which is delivered at the flywheel. It is the useful horsepower and is measured or determined by using a dynamometer of some type. A formula which gives fairly accurate results for ascertaining the horsepower of any four-cylinder motor at 1,000 feet per minute piston speed is the S. A. E. formula, which is expressed horsepower equals $D^2 \times N / 2.5$.

Where D is the bore in inches and

N the number of cylinders.

Motor Age does not know what you mean by motor horsepower, as distinguished from brake horsepower.

MOTOR HAS A LOOSE FLYWHEEL

Causes a Knock Which Reader Cannot Understand—Clutch Bearing Affected

Watonga, Okla.—Editor Motor Age—I have a 1915 Hupmobile, the motor of which developed a knock after the first few days of use. I have examined the crankshaft bearings and connecting rods and find them all right. I have noticed that when the engine is idling that by pressing on the clutch pedal slightly the knock would stop, and can never be heard when the engine is speeding. I took the pan beneath off and found that there was slight play in the flywheel, which makes me believe that one of the bolts which hold the disk clutch in position is possibly too small or not in straight.—A. C. Vickery.

The fact that the flywheel is loose would seem to indicate that the knock is caused by the crankshaft slapping back and forth. The clutch thrust bearing may have been injured because of continual running with this end play. Motor Age suggests you take the car to the nearest Hupmobile service station and have the parts looked over carefully.

INCREASING SPEED OF THE CAR

Procedure for Tuning Up the Engine—Boring Holes in Pistons

Elgin, Ill.—Editor Motor Age—I have a Hupmobile 20, 1910 model and wish to increase the power of the motor as much as possible without reboring the cylinders. Would Motor Age advise putting a $\frac{1}{8}$ -inch plate on top of the piston?

2—in drilling holes in pistons to make them lighter, how much can be taken off and how should they be drilled?

3—Would three-piece piston rings fitted to the cylinders take up the eccentricity of the cylinders better than common piston rings?

4—Could the Hupmobile motor be made to take in a larger charge of gas?—G. A. Schmidt.

1—The use of plates on the piston tops is not advised. To increase the speed the valve seats should be increased in size and new and larger valves obtained. If only the intake valves can be made larger, it will help. Increasing the size of the valve seats may be done with a counterbore or valve-reseating tool. New valves may be purchased at a comparatively low price. The lift of the valve may be increased slightly by substituting larger cams. Much will depend upon conditions as to just how the magneto shall be reset. Setting the magneto ahead will cause the motor to stop if the throttle is set down too far. If it is possible to use a larger carburetor and intake manifold, it is best to do so, for if the intake valves are made larger more mixture can be accommodated. The frictional loss in the motor is reduced somewhat by removing one of the piston rings, but if the pistons have but two narrow rings this should not be done. Lighter pistons help matters materially. Some use magnalium, semi-steel or steel, while others take the old pistons and drill holes in them. Care should be taken in doing this work, that each piston weighs the same as any other piston. If possible use lighter connecting rods, but it would not do to remove metal from the old ones, for the strength may be impaired. New rods of stronger metal and thinner section, or hollow rods, are better.

One of the first essentials for a speedy car is to have a pressure oiling system with a hand control on the dash or other place within easy reach of the driver. This consists merely of a hand pump drawing oil from the tank and forcing it to the crankcase. Ball check valves properly placed can control the direction of flow.

In nearly all racing cars the motors are equipped with magnetos of the double distributor type, so that they feed to two sets of spark plugs at the same time.

2—You can safely drill eight $\frac{3}{16}$ -inch holes equally spaced around the piston. In drilling, place a cylindrical block of wood into the piston, the wood just fitting. This will prevent the metal from cracking. You can hold the piston under the drill with your hands.

3—if the cylinders are badly eccentric have them reground. Multi-part piston rings quickly lap themselves into the cylinders and may help a little.

4—Yes, by using larger valves for the inlet and using a slightly larger inlet manifold and carburetor.

Horsepower of Racing Motors

E. St. Louis, Ill.—Editor Motor Age—What is the highest American made racing machine? Give horsepower.

2—What amount of water and fuel do most road racing machines hold?

3—About how long would it take for a young man 17 years old to become a race driver by working in a factory employing a racing team?—Geo. J. L. Scoblic.

1—The Mercers, Stutzies and Duesenbergs show about 150 horsepower.

2—The amount of fuel carried will de-

pend upon the race. In road races the cars carry anywhere from 15 to 30 gallons. Twelve gallons is a good figure for water.

3—This will depend upon the man.

HOW TO USE ELECTROMAGNETS

Unlike Poles Should Be Placed in Contact

—Tapping Magnet Helps

DeQueen, Ark.—Editor Motor Age—Who manufactured the motor used in the Gleason two-cylinder car which was built in Kansas City?

2—Kindly explain how the Vulcan electric gearshift stops the sliding gear when it gets to neutral.

3—What compression has the Cadillac 1910 model?

4—What is the compression of the Buick model B 25?

5—Would Motor Age advise increasing the compression of the Cadillac?

6—How much do manufacturers use on the late models?

7—What model Schebler carburetor did Barney Oldfield use on the Stutz in the Los Angeles-Phoenix race?

8—Does Motor Age think that slightly rotating the poppet valves of an engine will prevent valves from improperly seating and carbon from forming on the valve seat?

9—Kindly give some information regarding charging magneto magnets with a Peerless magnet charger. I have the makers' data but cannot get good results.

10—What should a magnet from a Remy type S pick up when fully charged?—D. J. W. Tibbits.

1—Motor Age does not know the maker of the Gleason motor.

2—The Vulcan electric gearshift was fully described and illustrated in Motor Age, issue of December 24, page 34.

3—About 70 pounds.

4—About 65 pounds.

5—No.

6—Present motors use from 60 to 75 pounds compression.

7—Oldfield used a model L Schebler on his Stutz car.

8—Oscillating the valves will tend to keep the seats clean and thus the valves will seat better.

9—The magnet should be placed on the electromagnet so that the N pole of the magnet faces the S pole of the electromagnet. Slightly tapping the magnet during charging will help. You have have a charging source with insufficient current capacity.

10—It should lift and hold about 15 pounds.

How Starter Gears Mesh

Dexter, Minn.—Editor Motor Age—Why is it that sometimes when the starter pedal is pressed on a 1914 Overland the starting motor spins but the engine does not? Then, when it is pressed again it may turn the engine all right?

2—What size tires does the new McIntyre 25 use? The Vulcan 35?

3—How is the starting motor on the 1915 Overland thrown into gear with the flywheel?—L. L. Medbery.

1—This may be due to trouble in the sliding gear. A weak battery will cause the same action. Take the car to an Overland service station and have the starter examined.

2—The McIntyre 25 uses 30 by 3 tires and the Vulcan 32 by 3½.

3—You do not state which model Overland. In the model 80 pressure on a pedal causes the armature shaft, which has a gear at its end, to slide forward, so meshing the starting motor gear with the teeth on the flywheel. In the other models the gear is not permanently fastened to the armature shaft but slides back and forth on a screw.

Electric Lighting, Cranking and Ignition Systems

Standard Types and How They Operate

Part IV—Delco, Westinghouse and Remy

By Darwin S. Hatch

Editor's Note—This is the fourth of a series of articles descriptive of standard types of electric lighting, starting and ignition systems as installed as stock equipment on 1915 cars. The first installment of the series appeared January 7 and covered the theory of the subject in general.

DELCO systems are all but the latest one of the single unit type; that is, starting, lighting and ignition are all taken care of by a single instrument. This instrument is a motor-generator, having two commutators, one for the motor function and the other for the generator feature. It also has a timer-distributor and coil for the ignition. The instrument is mounted on the side of the motor so that when operating as a generator it is driven through an overrunning clutch by an extension of the pumpshaft; when operating as a motor the instrument cranks the engine through a clutch and reduction gears to teeth cut in the flywheel rim. All are of the one-wire system, using the frame as a common return.

Each Delco installation varies slightly from the others as applied to different models of cars, but the systems can be divided into three different types, which we will call A, B and C. Type A is applied to the Buick C-24 and C-25 and the Carter-car. Types B and C are variations of this, chiefly with added features. A description of Type A will show the general design of all the Delco systems and the variations which characterize the other two types will be taken up later. The description applies to all the three types except for the variations mentioned later.

In the installation which we have called the type A, both commutators are mounted at the front end of the armature, Fig. 21 and the main switches which control the flow of the current into or out of the instrument are in the mounting of the brushes. One motor brush and one generator brush are mounted on a rocking arm, so interconnected that when the generator brush is on its commutator, the motor brush is away from its commutator. This prevents the unit from attempting to operate as a generator and a motor simultaneously.

The brush switch is operated automatically by the starting pedal, which is con-

nected to the switch in such a way that when the pedal is pressed to shift the starting gears, the generator brush is raised from its commutator and the motor brush is lowered to its commutator, so the motor windings are in circuit and the generator windings disconnected. When the starting pedal is released, the motor brush leaves the commutator and the generator brush comes in contact with its commutator. Thus the instrument is in position to act as a generator, Fig. 22.

The Delco unit is really two machines, electrically, though it is only one mechanically. There is a common armature core and shaft and common field cores, but there are separate armature windings and separate field windings. The motor portion is a compound-wound machine; the generator portion is compound-wound, having a shunt winding and a reverse series winding on the field coils. This provides the current regulation and does away with the necessity of any external method of providing constant current. The ignition switch has a connection such that there is no connection between generator and battery unless the ignition is on. The generator is designed to deliver a charging current at very low rate so that normally there is little seepage of current from battery back to generator between the time the ignition is switched on and the time the generator is furnishing a charging current.

This back flow of current from battery to generator after the ignition is switched on is utilized to run the unit as a motor very slowly, to make the pinion and flywheel gear mesh easily when the starting pedal is pressed. This takes the place of the starting resistance incorporated with the starting switch in other systems.

The combination switch which controls the primary starting current, the lighting and ignition is shown diagrammatically in Fig. 23. The buttons marked M and B are the ignition buttons. The one marked M

controls the current from the Delco generator, which takes the place of the magneto and the B button controls the current from the dry battery, an extra source of current. Either button, when pulled out, completes an ignition circuit and, at the same time, completes the connection between battery and generator to rotate the latter slowly for starting. This is called "motoring the generator."

The other three buttons control the lights, the one at the extreme right having a resistance in circuit to dim the headlights. At the extreme left is the circuit breaker, a protective device which takes the place of fuse block and fuses. It prevents the discharging of the battery or damage to the light and horn wiring in case this wiring becomes grounded. This is simply an electromagnet arranged to be operated only by abnormally heavy currents, such as would occur in case of a ground. All the current to lights and horn and ignition passes through the winding of the electromagnet, and a dangerously heavy current through the winding, thus produces a strong magnetism which attracts the armature and opens the circuit. This cuts off the flow of current, which allows the contacts to close again, and the operation is repeated, causing the circuit breaker to pass an intermittent current and give out a vibrating sound, which is a warning of a short or a ground.

The ignition system comprises a distributor and timer carried on the front end of the motor-generator and operated by a vertical shaft through spiral gears, a non-vibrating spark coil mounted on the top of the unit and a resistance unit mounted on the distributor housing. This is a coil of resistance wire on a porcelain spool and is connected in the primary circuit between the primary of the ignition coil and the timer.

Under ordinary conditions, the resistance wire remains cool, and offers little resistance to the passage of current. However, if, for any reason, the primary circuit of the battery or generator should remain closed for any length of time, the current passing through the coil would heat it, increasing its resistance to a point where little of the current would pass. This insures against a waste of current from the battery and damage to the ignition coil and timer contacts.

In Fig. 23 is shown the wiring of the system, which we have called the type A and in the following, the path of the current is traced through the circuit in the different operations of starting, lighting and ignition. The system is the same in principle for types B and C and their circuits can readily be traced when the functions and connections of the added or substituted apparatus are explained.

Referring to Fig. 23, the generator and motor are shown as two different instruments, though they are really combined. The upper contacts K and X on buttons M and B complete the ignition circuit and the lower contacts J and Z control the motoring of the generator. Upper and lower contacts

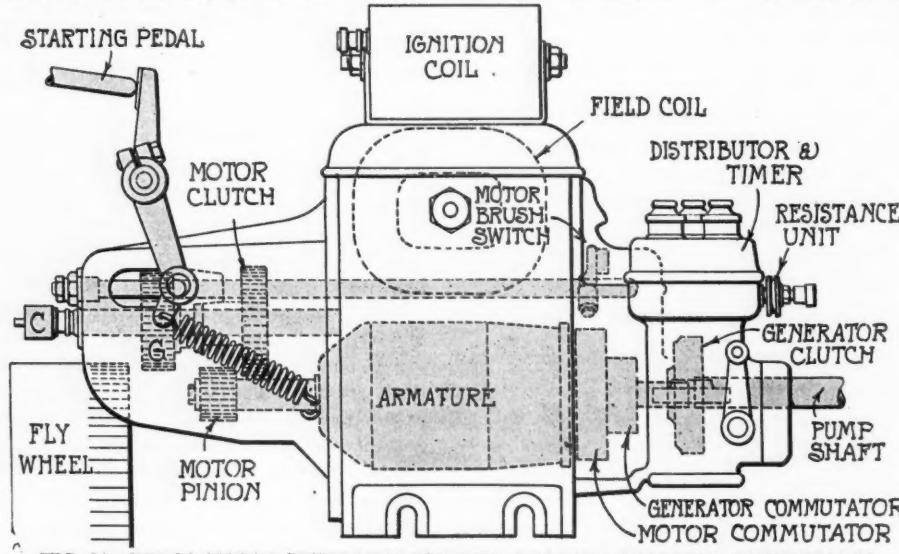


FIG. 21—DELCO MOTOR-GENERATOR-IGNITER, SHOWING STARTING CONNECTIONS

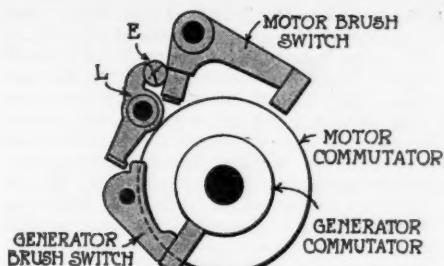


FIG. 22—BRUSH SWITCH ON DELCO

operate together, being on the same rod. The upper contact X on button B simply supplies current for the ignition from the dry battery and is used only in case the storage battery should be unable to do this.

Assume the condition as shown in the illustration, that is, all buttons down. Both dry and storage batteries are on open circuit. Current cannot go to the motor because the brush L is up. It cannot go to the generator, because the contacts J, K, X and Z are open. If the engine were being cranked by hand, with the ignition off as shown, the only passage of current would be from the generator armature through the brush A, reverse series field R to F to shunt field S to ground G1, G2 and brush H back to the armature.

Assume we get ready to start: we pull up button M, closing contacts at K and J. We get ignition current from the storage battery in the following way: From the plus terminal of the battery through E, switch terminal 1, D, circuit breaker Q, B, K Y, switch terminal 7, primary of ignition coil P1, resistance unit R1, timer, to ground at G7—with an electrostatic ground through the condenser C1 to G5. The circuit is completed through the ground to G4 and the negative terminal of the storage battery. The transformation and distribution of the ignition current is the same as in any battery system.

Motoring of the generator also occurs when M is pulled out. In this the circuit is the same as before to D, where some of the current goes to C to the contact J, to switch terminal 6, through the reverse series field R to generator brush A to brush H and to ground G1, completing the circuit through ground to G4 and the battery. A part of the current divides at F and goes through the generator shunt field to ground G2. Current through the generator causes it to be driven slowly as a motor.

If button B were pulled up instead of button M, the connections would be just the same, except that current from the dry battery would be impressed on the ignition circuit from the positive terminal of the dry battery, through 2, X to Y and the ignition circuit previously outlined. At the same time storage battery current would be sent to the generator from the point C through Z to the generator connection at A1.

Now, with the ignition on and the generator running as a motor, we press the starting pedal. This shifts the pinion on the end of the armature shaft, which is rotating slowly, into mesh with the gear train to teeth on the flywheel. As the pedal completes its movement, linkages lift the generator brush H away from its commutator and lower the motor brush L to its commutator. This disconnects the generator armature from the circuit and throws the motor in. Storage battery current is then impressed directly on the motor through E, the series field S1 brush L, the circuit being completed through brush L1 to ground at G3. This rotates the motor and through the flywheel starts the engine.

When the engine has taken up its cycle, the starting pedal is released, brush H goes to the commutator and brush L leaves its

commutator, putting the generator back into circuit and cutting the motor out. Also the pinion is retracted from the flywheel, and the generator starts to furnish current for the battery and ignition. This is accomplished through the following circuit: A, R, F, 6, J, C, D, where it divides, part going to the battery through 1 and E to the positive terminal of the battery, and part through Q, S, K, Y, 7, to the ignition.

Current for the lights and horn comes from the battery or generator from S to the bus bar X1Y1. Button N supplies the sidelights V from T through U to 5. Button O supplies the headlights, and P throws in the dimmer resistance.

The Delco system we have designated as type B is the one employed on the greater number of cars equipped with this make of starting, lighting and ignition. Among the cars on which this is used are: Buicks,

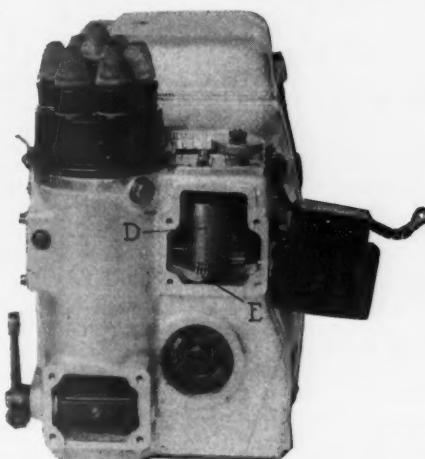


FIG. 24—DELCO UNIT SHOWING REGULATOR

36, 37, 54 and 55, Oakland 49 and 37, Oldsmobile 42, Cole Little Six, Paterson, Cadillac, Hudson 6-40, Moon, Auburn, Westcott and Jackson 6.

The chief structural difference from the type A system in the Delco unit is the placing of both commutators at one end of the machine instead of one at either end. There is difference, too, in the regulation of the generator output. It will be remembered that in the type already described the voltage regulation is obtained by the compound winding of the generator fields, having a shunt field and a reverse series field.

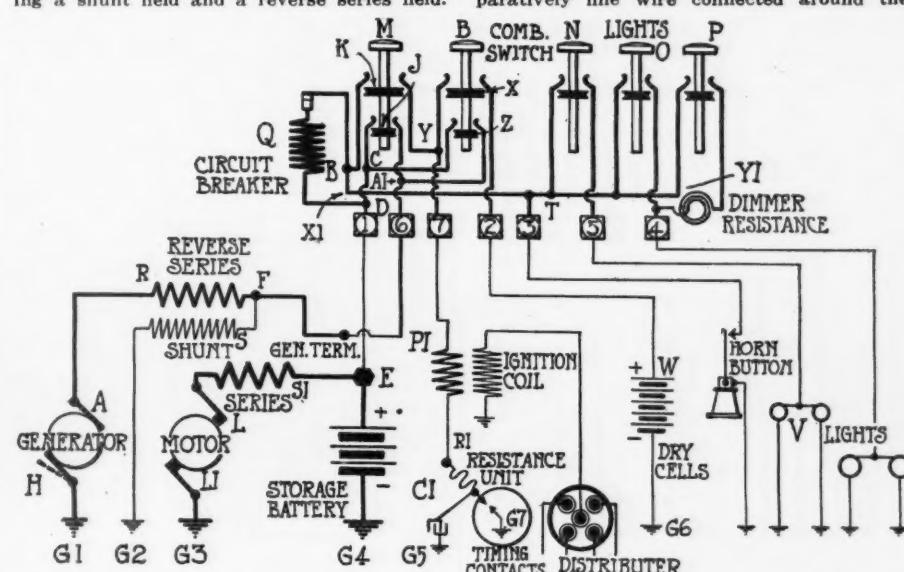
In the type B, the reverse series field is omitted, leaving only the shunt field and the regulation is obtained by an automatic regulating resistance which also acts as an automatic spark control and is contained within the distributor housing. It consists of a spool of bare resistance wire, D, Fig. 24, inserted in the shunt field of the generator. On this spool is a contact, E, which can move up or down on the spool. The contact is shorted direct to ground, so that as the contact moves up on the spool it cuts in more and more coils of resistance wire and when it is at the top of the spool, all the resistance is in circuit and the current through the shunt field is weakened correspondingly.

The contact is attached to an arm operated by a centrifugal governor on the timer shaft so that as the armature speeds up, more resistance is inserted and the output of the generator thus controlled. Also the ignition resistance is grounded through the regulating resistance and is cut out of the ignition circuit when the arm is at top position. This increases the intensity of the spark at high speeds.

Type C is used on the Oldsmobile 55, Cole Big Six and Hudson 6-54. In this, the combination switch is of a different type and has not the double-contact feature of the others. Instead of this an automatic cutout relay is used to close the circuit between the generator and storage battery when the generator voltage is high enough to charge, and open the circuit as the generator slows down. It is of the electromagnetic type already described.

Instead of the governor-controlled variable resistance used in the type B systems to control the generator output, a solenoid-mercury well voltage controller is employed. This is of the type described January 28. Motoring of the generator is obtained by a push button on the combination switch.

There is an added feature in the ignition circuit of the type C outfit. This is the ignition relay which is connected in the dry battery circuit. It serves to break the primary circuit immediately after it is completed by the auxiliary contact mechanism in the timer, thereby inducing a high-tension flow through the secondary circuit, which results in a hot spark in the spark plug. It is simply an electromagnet, having two windings, one of coarse wire carrying the main ignition current. It is connected so that current through this winding energizes the core, attracts an armature which opens the circuit. The other winding is of comparatively fine wire connected around the



point of break in the main circuit, so as to hold the armature down by the current shunted through the fine winding when the main circuit is opened. If it were not for the fine wire winding the making and breaking of the main circuit would give a vibrating spark at the plug, instead of a single

spark. This vibrating effect is purposely produced for starting by opening the circuit through the fine wire winding, when the button on the combination switch is held in. On the new Cole eight is a two-unit Delco system, comprising a generator-igniter and a separate cranking motor at the flywheel.

Westinghouse Cranking, Lighting and Ignition

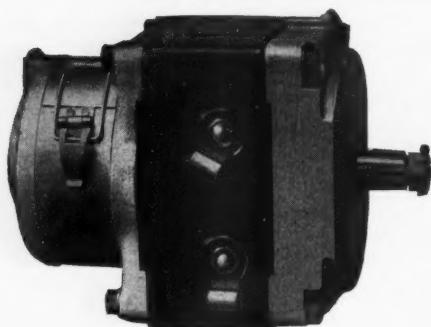


FIG. 25—WESTINGHOUSE STARTING MOTOR

ELECTRICAL apparatus of Westinghouse make for motor cars includes both three-unit and two-unit systems, and these are made in a number of different types and capacities for different applications. Most of the apparatus is in the form of separate units, and these are all for 6-volt operation. However, there is a motor-generator designed for crankshaft drive which operates on 12 volts. Also combination lighting and ignition generators are supplied, the generators having the feature of automatic spark advance.

Generators are shunt wound or differential wound and arranged to operate at magneto shaft speed, so that they can be connected to the magneto shaft through simply an Oldham coupling. All wiring is on the single-wire principle. When the generator attains a speed higher than that at which it generates the battery voltage, a switch with silver contacts inside the generator automatically connects it to the circuit. The switch is so adjusted that it disconnects the generator at a speed 25 to 30 per cent lower than the cut-in speed. This difference in speed between connection and disconnection provides against the switch operating in and out continuously when the car is running at the speed at which the switch closes the circuit. As the generator delivers normal voltage at the speed at which it is connected in circuit, there is no possibility of the battery discharging into the generator.

Generators are of two types with respect to the regulation of output. In one type the current supplied by the generator is regulated inherently by the winding of the machine, the control of the voltage depending on the storage battery. In the other type an automatic potential regulator, which forms part of the generator, keeps the voltage constant and regulates the battery charge.

Generators with inherent regulation have a compound field winding. The battery charging current passes through the series winding in such direction that any increase in the battery charging current tends to reduce the voltage generated, so that the battery is never charged at an excessive rate. When the lights are burning, however, current flows through this series winding in the reverse direction, increasing the output of the generator and causing it to assist the battery in carrying the load.

Generators with automatic potential or voltage regulators maintain constant voltage regardless of whether the battery is connected to the system or not. The character-

istics are such that the battery-charging current tapers off as the battery charge increases. The regulator consists of a vibrating armature that intermittently shorts-circuits a high resistance in series with the shunt field winding of the generator, the length of the short-circuit period depending on the load on the generator.

Reference to Fig. 26 will be made to explain the circuits and operation of the system. To control the generator-battery circuit a self-contained reverse-current relay switch is mounted within the generator. Two separate coils, a shunt of comparatively small wire and a series of large and low-resistance wire are retained on a core A by end pieces which serve as poles for the magnetic circuit. An armature C bridges the pole pieces and is held in the open position by means of a spring. When the generator is brought from zero to a speed at which a pre-determined voltage is generated, a certain amount of current will be flowing from the + brush to a to b to c to d to the - brush.

This is the shunt field and the battery cut-out circuit and is always closed. The switch coils are wound in a direction to be compounded under the above condition, and the effect of the sum of their ampere-turns closes the switch against the spring tension. The generator is now grounded through the contacts e and a charging current of from $\frac{1}{2}$ to 1 ampere will be flowing through the battery as follows: From + brush to a to b to e and back through the car frame to the - brush.

Suppose now the generator falls below the cut-in speed. The battery will discharge proportionately as the speed decreases, until the discharge current reaches a value of approximately $\frac{1}{2}$ ampere. Because of the discharging of the battery through the generator the current has been reversed through the coil ab; hence the pull due to the shunt coil bc is reduced by the difference between the reversed ampere-turns and the shunt ampere-turns of the coil ab, until the spring tension overcomes it; the armature is released and the battery circuit broken. The switch will not close again until the original cut-in speed is reached.

Voltage regulation is provided as before mentioned by a differential series coil. This coil is wound with a large low-resistance wire, of few turns compared to the shunt coil. After the cut-in speed is passed and the speed increases, the charging current and voltage increases rapidly. This increasing current, passing through the series coil, more and more offsets the strength of the shunt coil as the current builds up. The series coil has little effect at low speeds, but causes a rapid change in the current curve when it has nearly approached the maximum desired value.

The foregoing was considered without a lamp load. If we now close the lamp switch with the generator at

rest, or below cut-in speed, we have a circuit from f to ground, back through the lamps, switches and fuse to L to d to B to g. Since this current is going through the series coil N in an opposite direction from that of the battery charging current its effect is not differential now, but aids the shunt coil S, raises the voltage and lowers the pick-up speed. When the battery is cut in, another circuit for the lamps is formed through the armature in parallel with the battery and the series coil N. The generator now begins to take the load away from the battery. As the speed increases, a point will be reached where the generator just furnishes the lamp load and the battery current is zero. This is called the balance speed and is lower than the speed at which an equal current is sent to the battery without lamps.

Westinghouse motors are of the four-pole, series-wound type, the field winding being placed on two of the four poles. Fig. 25 illustrates a Westinghouse starting motor. They generally are applied by gearing to teeth on the flywheel. A pinion is shifted into mesh with the flywheel gear on starting, and when the engine runs on its own power, the pinion is shifted out of engagement. The shifting can be done mechanically from a pedal or lever, automatically by a worm-shaft mechanism, or electromagnetically by a combination of electrically operated switch and pinion-shift. No pinion shifting is used with the motor-generator.

When the shifting is done mechanically, with one motion of the starting pedal the motor is first started at low speed, then current cut off until the gears mesh, when full voltage is thrown on the motor, turning the engine over until the starting pedal is released. Releasing the starting pedal releases the gear and cuts off current from the motor. This is illustrated and described in detail on page 51, Motor Age, issue January 7.

A worm-shift mechanism can be furnished which automatically meshes the driving pinion with the engine gear-wheel when the starting motor circuit is closed, and automatically releases it when the engine tends to drive the motor. This type of mechanism has met with success on six-cylinder cars, but is not generally suitable for use with four-cylinder engines, owing to the tendency to pulsating action in cranking, due to compression. With automatic gear-shift, either a foot-operated switch or a pushbutton controlling a solenoid switch can be used.

In the electromagnetic pinion-shifting system, either a pushbutton is used to close an electrically-operated switch, or a switch similar to that used with the automatic pinion-shift is used. Closing the main switch first starts the motor at low speed, then operates the electro-magnetic pinion-shift. This in turn cuts power off the motor so that it revolves from its momentum until the gears mesh, and then throws full volt-

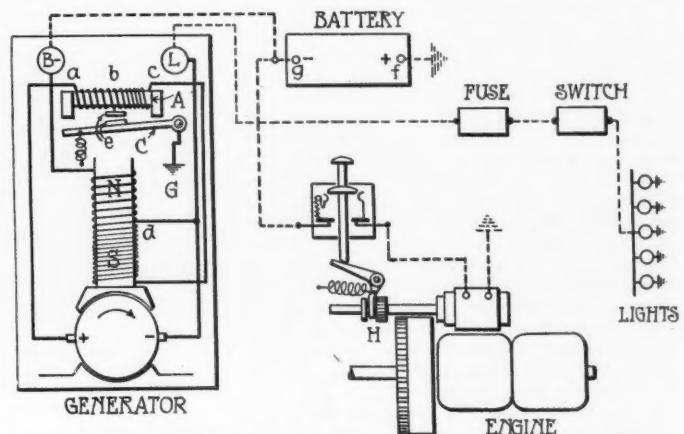


FIG. 26—CONNECTIONS OF WESTINGHOUSE SYSTEM

age on the motor, turning the engine over. Releasing the starting push-button opens the electrically-operated switch which cuts current off the motor and returns all parts. The electrical connections are such that, when the engine runs at a speed sufficient to cause the generator to deliver battery voltage, the electrically-operated switch opens, even though the driver fails to release the starting push-button.

In the motor-generator system, at low engine-speeds, the motor-generator acts as a motor, assisting the engine and causing

an immediate restart in case of stalling. This is an emergency feature of importance, particularly when a delay in restarting a stalled motor is dangerous. It should not be resorted to except in emergency, however, as naturally it reduces the charge.



FIG. 27—THREE TYPES OF REMY CRANKING MOTORS

Remy Apparatus for Cranking, Lighting and Ignition

ONE of the most complete lines of electric equipment for motor cars is that manufactured by the Remy Electric Co., Anderson, Ind. Apparatus of several different types and sizes in one-unit, two-unit and three-unit systems are manufactured. Separate starting motors, Fig. 27, separate generators and separate ignition appliances are produced. There are also various combinations of these; single-armature motor generators, double-deck, two-armature units, Fig. 28, in which generator and motor are distinct but combined in the same housing, generators with which the ignition feature is combined, and lastly, a motor-generator-ignitor for single-unit systems.

Latest of the Remy developments is a special electric equipment for eight-cylinder cars.

Apparatus is designed to meet the requirements of each particular make of engine, but almost all the 1914 models will be continued for 1915, as few of the manufacturers using Remy equipment have made changes in the design which necessitate different electrical installations.

Some motors are arranged for connecting direct to the car maker's reduction gearing, others are designed to become an integral part of the reduction transmissions, others with the Remy inertia pinion which automatically engages and disengages with the flywheel of drive. Those standard starting motors are all wound for 6 volts and the variety is such that there is a motor for almost every size of engine.

Four sizes of the two-armature motor-generators are offered. These instruments combine a generator and a motor into one unit with the reduction gearing and overrunning clutch built in and operating in an oil bath. These instruments are wound for 6 volts and require but one point of attachment to the engine. These instruments are familiarly called "double-deckers," the generator armature being in the lower portion with the motor armature superimposed. The motor armature rotates only when the starting switch is closed and at such times drives the generator shaft through the medium of an over-running clutch of the roller type.

They are built in various sizes according to engine requirements.

The single-armature motor-generators are wound for 12 volts and are built either cylindrical or rectangular and in a number of sizes. Any of these may be had with the Remy battery ignition forming starting-lighting-ignition in one unit.

The numerous separate generators are built either with forged or cylindrical pole pieces and, as might be surmised, there is a generator of the proper capacity for any of the conventional starting and lighting loads. It is to be noted that some of the generators are built in magneto base heights, that is, they can be installed in place of the magneto.

Ignition-generators, that is, instruments arranged as one unit, provide both ignition and current for lighting and starting. It is to be noted that the instruments may be had with all parts integrally mounted or arranged for mounting separately according to the needs of the installation. Two different types of battery ignition are offered, the conventional magneto form of distributor and circuit breaker, and the vertical type, comprising both distributor and breaker.

With the advent of electric generators for car lighting purposes, the Remy company developed an ignition system utilizing current from a storage battery which is kept charged by the generator and three forms of such ignition devices are supplied. The first is that of a distributor and transformer coil mounted on a base of magneto dimensions, allowing it to be mounted on the engine base formerly utilized by the magneto. The second is an instrument for vertical mounting, comprising both distributor and breaker for camshaft-speed drive. The third is an instrument of the conventional magneto form. The instruments may be had for either 6 or 12 volts.

NEW MEXICO'S ROAD REPORT

Santa Fe, N. M., Jan. 30—It is shown by the records of the state engineer's office that during the year 1914 a total of \$526,000 was expended for the construc-

tion of good roads in New Mexico. This year \$520,000 will be spent, exclusive of an issue of \$500,000 state bonds which have not yet been sold. Last year's total included the proceeds of the \$100,000 Dona Ana county bond issue.

This year the state highway commission will supply \$191,000; the counties will furnish \$329,000, including \$45,000 from Dona Ana county bonds. The state commission will raise \$90,000 by a 1-mill levy and \$75,000 by special levies and contributions. The motor car license fund will provide \$20,000, and the forest reserve fund, \$6,000.

The counties will raise \$175,000 by the general road and bridge levy; \$75,000 by special bridge levy, and \$20,000 by the Camino Real levy. The United States forest service will spend \$9,000 direct on the improvement of highways within national forests.

The annual report of State Engineer French will show the Camino Real practically complete from the Colorado line to El Paso. Important work next year will be the Santa Fe-Taos road, the Los Lunas-Gallup road, the Ocean-to-Ocean highway from Socorro to the Arizona line; the All-Southern route and the Borderland route to Las Cruces and from El Paso to Douglas.

REPUBLIC TO RETIRE STOCK

Youngstown, O., Jan. 30—At its annual meeting January 25 the Republic Rubber Co., of this city, will place before its stockholders a plan to issue \$2,500,000 preferred stock, with the proceeds of which the preferred stock now outstanding will be redeemed. The new issue of \$2,500,000 to retire old stock will bear the same rate of interest as the stock to be redeemed.



FIG. 28—REMY DOUBLE-DECK UNIT

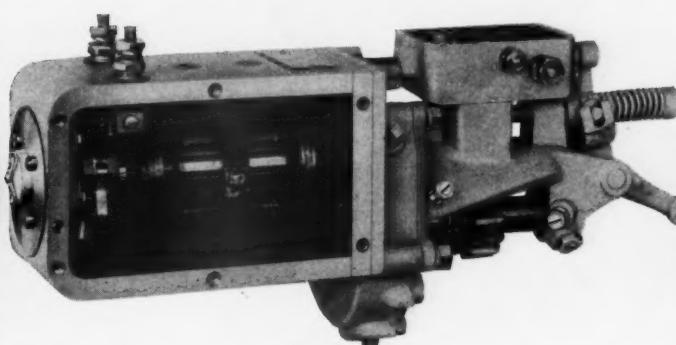


FIG. 29—REMY CRANKING MOTOR

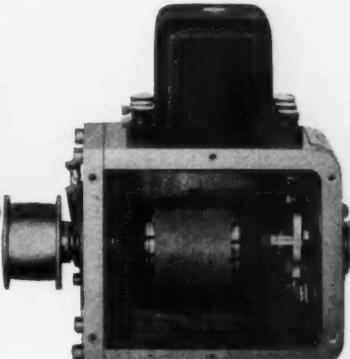


FIG. 30—REMY GENERATOR



The Accessory Corner



Utility Compressor

THE Utility Compressor Co., Detroit, Mich., is the maker of a compact form of garage air compressor unit which is designed for electric motor drive and in its usual form is fitted to a portable carriage, permitting of its use in any part of the garage where electric current is available.

The compressor is air-cooled and rotary-drive, the rotary action being converted into a reciprocating motion of the eight pistons by a connecting-rod rocker, which is pivoted on a specially-designed universal of sufficient strength to take the entire end thrust of the pistons. The smaller end of the connecting-rod rocker is engaged in the crankshaft a sufficient distance from its center to permit of a $1\frac{1}{8}$ -inch stroke in the pistons. This imparts a circular or

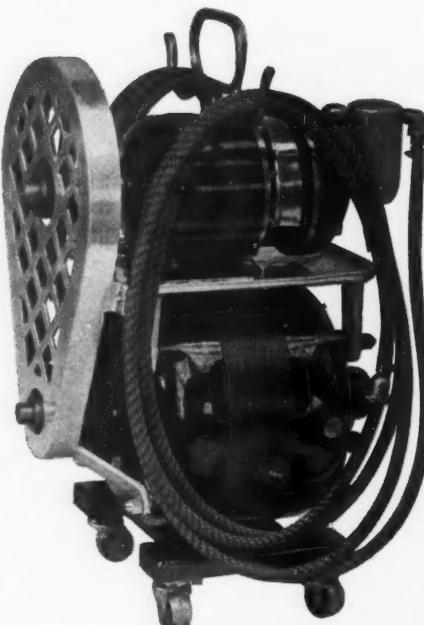


Fig. 2—Utility compressor a compact form of garage air pump outfit. A $\frac{1}{2}$ horsepower motor for 110 to 220 A. C. or D. C. may be had

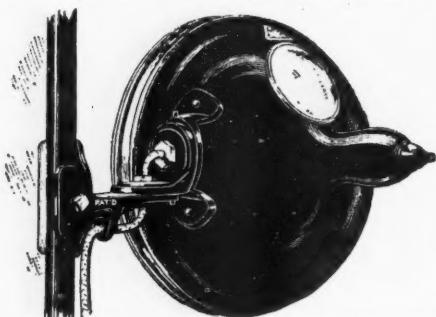


Fig. 1—A combination rear view mirror and searchlight called the Neutype

wave-like motion to the connecting-rod rocker and delivers the power in turn to each of the pistons, thereby giving a continuous flow of air and a steady pull on the driving arm or crankshaft. A small blade is attached to the crankshaft which dashes oil over all the moving parts.

There is but one discharge valve for each cylinder and they are all mounted in one plane, and their lift is only .01 inch, which makes for quietness. The intake is through a stationary port, which is cut in each of the cylinders.

The cylinder bore is 1 inch and the speed of 450 r.p.m., with a capacity of 2.1 cubic feet of free air per minute. The overall length of the compressor is 13 inches and the diameter 5 inches. The net weight is 20 pounds.

Using this compressor, two types of portable garage units are supplied by the Utility company. These are known as models A1 and A2, the latter having automatic electric pressure control. The motor is a $\frac{1}{2}$ -horsepower General Electric, the options of A. C. or D. C. and 110 or 220 volts being given, so that any supply current can be utilized. Drive from the electric motor to the compressor is by silent chain, as shown in Fig. 2.

Model A1 weighs 100 pounds and meas-

The work is done under what is known as the Radio process. Humidified, water-washed air is pumped into a series of large ovens by a fan blower and superheated by coming into contact with radiators. The ovens are operated under low-heat temperature conditions and according to officials of the company the varnish will dry in 3 hours, whereas, in the ordinary methods, it takes 3 days with the use of heated air. It is stated also that each coat is dried all the way through instead of merely on the surface and for that reason there is no danger of discoloration through sweating.

Bell Grease Gun

Oil and grease guns are motor car accessories which the average owner looks upon as standard. However, the Bell

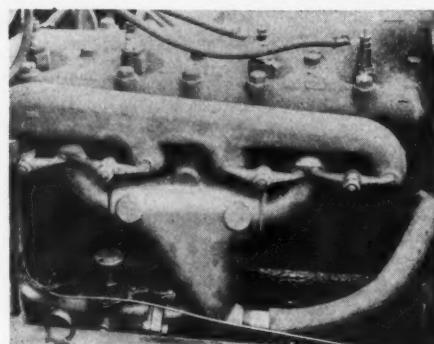


Fig. 4—A water-jacketed inlet manifold for Ford cars which takes the place of the regular manifold

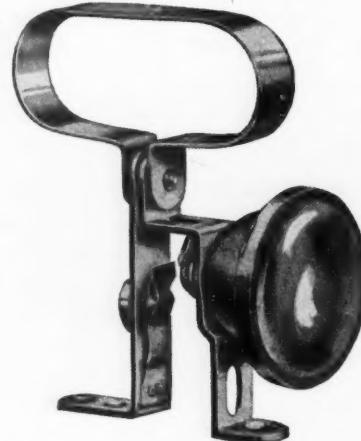
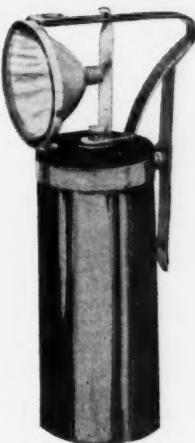


Fig. 3—Redsealite a form of trouble light which is attached to an ordinary dry cell. The switch is shown opposite the rear of the lamp

Pump Co., Detroit, has produced a combination oil and grease gun which incorporates a modification of the Bell plunger as used in tire pumps of this make. The leather plunger is secured to the plunger rod and is cup-shaped. Below the leather is a disk which is beveled at its outer edge. This fits inside the leather cup and is held to it at all times by a spring. Above the main leather cup there is another in reversed position. On the down stroke, the pressure of the oil or grease forces the disk against the cup, and thus makes the latter closely adhere to the walls of the gun so as to prevent leakage. On the up stroke the spring acts to force the metal disk against the leather which must therefore maintain the same close contact with the walls. This prevents leakage in this direction, and it is assisted by the reversed leather plunger. It is said that with this feature the gun has a vacuum which will readily draw a No. 2 grease. Heavier greases are packed by hand. The gun is shown in Fig. 8.

To empty the gun, an eccentric ring is fitted to the top of the gun. By the turning of a lever, an eccentric disk fits into

Fig. 5—Meteor trouble lamp, which is mounted on a dry-cell



the square thread of the plunger rod, and makes a nut on which the thread can operate. Then by turning the handle, the grease is expelled. Thus, the gun is a combination, for with the handle off, it acts similarly to any plunger gun, and is readily converted into a screw type.

Kellogg Turbine Muffler

A new type of muffler has been brought out by the Kellogg Mfg. Co., Rochester, N. Y., this muffler being called a turbine, from the fact that its construction incorporates a turbine wheel for assisting in expelling the exhaust gas and thus reducing back pressure and saving power. The Kellogg muffler, shown in Fig. 7, consists of two cylinders of circular section, one of these being fitted with a turbine wheel and the other an expansion chamber fitted with a baffle plate. Slightly forward of the wheel is a by-pass, which leads to the center of the wheel. The exhaust gas passing through the turbine cylinder causes the wheel to revolve and this in turn causes the suction which pulls the gases out of the exhaust pipe. The expansion chamber then takes the gas and breaks it up so that its pressure is almost equal to atmospheric. The Kellogg muffler is said to effect a fuel saving and add more power because of its back-pressure reducing quality.

Newtype Mirror Searchlight

A combination rear-view mirror and searchlight is the latest product of the Wood Mfg. Co., Fairfield, Conn. This new accessory is an improvement of the Newtype searchlight which the concern has been marketing for some time. The searchlight is mounted convenient to the driver and may be turned in any direction so that all parts of the road, both ahead and at the sides may be made visible at night. In combination with this lamp is a rear view mirror, as shown in Fig. 1.

Springfield Circle Cutter—The repairman will be interested in the Springfield Circle Cutter, a device manufactured by The Shawver Co., Springfield, O., with the aid of which he can cut quickly and accurately lamp glass, sheet copper and rubber gaskets, felt and fiber washers, etc. This cutter has a capacity for any size circle up to 14 inches diameter, and is provided with a positive measuring scale to determine sizes.

Waterjacketed Ford Manifold

In order to increase the mileage per gallon of fuel of the Ford car and to obtain smoother running of the motor, the Motor Devices Co., Mansfield, O., has brought out

a hot-waterjacketed inlet manifold. This part takes the place of the regular Ford manifold and for installation requires the drilling of only one hole, and the connecting of the water pipe, as shown in the illustration in Fig. 4. The manifold is made of brass and sells for \$7.50.

Universal Muffler

A turbine type of muffler is being marketed by the Moline Muffler Mfg. Co., Moline, Ill. The feature of this type being its ability to pull the exhaust gas from the exhaust pipe into the muffler instead of allowing the gas to flow naturally. The object is to eliminate back-pressure in the exhaust system and so utilize all the power the motor is capable of developing. The Universal muffler is shown in Fig. 6 and the gas-pulling unit is in the form of a ten-bladed fan placed as shown. When the engine dispels exhaust gas the wheel begins to revolve and in doing this pulls the gas through and forces it into the muffler proper. Here are four baffle plates as shown in the illustration. The plates break up the gas. The material is sheet steel and the price \$16.50.

Meteor Lamp

A convenient form of trouble lamp for motorists is the Meteor, shown in Fig. 5, which consists of a bracket holding a small lamp, the bracket being fastened to the terminals of an ordinary No. 6 dry cell, of any make. There is a metal handle for carrying the lamp. The bulb is a tungsten fitted to a parabolic reflector. The switch is on the top cross piece. Price without battery, \$1; with battery, \$1.25.

Redsealite

Another form of dry-cell trouble lamps is that manufactured by the Manhattan Electrical Supply Co., New York, and shown in Fig. 3. This has a suitable handle at the top and two arms which are



Fig. 6—Universal, a form of turbine muffler which uses a revolving wheel to pull the exhaust gas from the pipe into the muffler, thus assisting in reducing back pressure

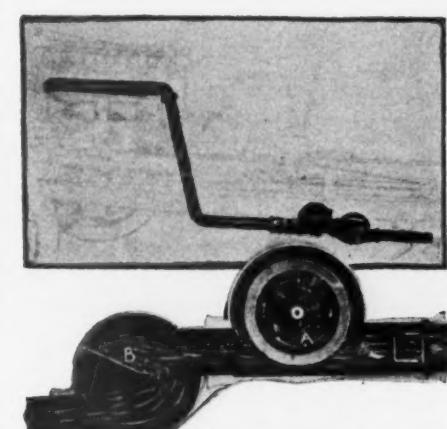


Fig. 7—Kellogg turbine muffler which is said to reduce back pressure in the exhaust system



Fig. 8—Bell grease gun which is used either as a screw or plunger type

fastened to the dry-cell terminals. On one of these arms is a small switch. The bulb is a tungsten. Price is \$1 with battery.

Hind View Mirrors—The line of Hind View car mirrors made by Kales-Haskell Company, Detroit, includes types for front fenders, straight windshields, zig-zag windshields for Ford cars, motor trucks and the various styles of bodies. The price of the Hind View mirror is \$2.50 with a plain mirror and \$3.75 with a lens mirror, while when made all of nickel the price is \$3 with plain mirror.

Basline Autowline—A strong, easily-stowed-away tow-line is a necessity in long-distance touring. Indeed, if it takes up but little room, it could well form a part of the permanent equipment of every car. Such a needful is the Basline Autowline, manufactured by the Broderick & Bascom Rope Co., St. Louis, Mo. It consists of about 25 feet of steel wire rope, to each end of which is attached a snaffle hook which permits of instant attachment to the towing and towed cars.

The Friestadt Rim Contractor

A novel type of rim contracting tool for straight-side split rims is the Friestadt announced by A. A. Friestadt, 2936 West Lake street, Chicago. With this tool the pull of a handle causes the rim to contract and thus leave the tire, as shown in the illustration in Fig. 9, making tire removal quite easy. The forked portion shown may be spread or compressed so as to accommodate all widths of rims. The price is \$2. No Change in Two-in-One-Price

In the description of the Two-in-One Vulcanizer, made by the Lazarus Mfg. Co., 746 Euclid avenue, Cleveland, O., Motor Age, in its issue of January 21 stated that the price of the vulcanizer is \$2. This is an error. The price is \$2.50 and it may be used for tubes or casings.



Fig. 9—Showing Friestadt rim contracting tool in use

From the Four Winds

LECAIN Starts for Pacific—Jack LeCain, one of the star drivers of Boston, Mass., has started for the Pacific coast with his Chevrolet to enter the Vanderbilt and grand prize events this month. He has the same car in which he won the fastest 10-mile handicap event ever run off on the Brighton Beach track last season.

To Extend Cannon Ball Trail—The Cannon Ball trail, which is now one of the best marked highways between Quincy, Ill., and Chicago, is to be extended south to Monroe City, Mo., where it will connect with the cross-state highway from St. Louis to Kansas City along the Burlington railroad. An effort is being made to induce transcontinental motorists who desire to touch Kansas City to use this route.

\$10,000 Purse for Redondo Race—The latest southern California road race project is the proposed race over the Redondo course scheduled for September 9—Labor day. The event held there last Sunday, in which there were 34 starters, all supposed to be amateurs, paved the way for a real motor race and the Redondo Automobile Association has announced that a road race will be held in September for a purse of \$10,000.

Michigan Road Builders to Meet—Five thousand good roads enthusiasts are expected to gather in Grand Rapids the second week in March for the annual meeting of the Michigan Good Roads Association. There are 12,000 members of the association in the state, and among these are 860 township highway commissioners besides the county commissioners of each county. For the education of these men a big exposition of road-building machinery will be a feature of the exposition.

Flowers to Beautify Lincoln Way—When the stream of eastern motorists begins to pour into California next spring over the Lincoln highway, they will pass for mile after mile between rows of the famous California poppies, while the Foothill boulevard, leading into Oakland, will be further beautified with a fringe of blue pines, which will set off the brilliant yellow of the poppies. The seed will be planted along the highway by the school children of Alameda county.

Quarters For New Haven Club—Plans have been completed whereby the New Haven Automobile Club is to have permanent headquarters at the Hotel Taft, and a secretary will be paid to be there all the time so as to give information to visitors passing through the city. The club is now the largest motor organization in New England with the exception of the Massachusetts Automobile Club of Boston, Mass., which does not do anything in the way of motoring except run a garage.

More Funds for Colorado Roads—Substantial highway improvements in 1915 were pledged at the fifth annual convention of the Colorado Good Roads Association by delegates from sixty-one of the state's sixty-three counties. The meeting was the largest ever held by this organization, and it was considered the most important thus far on account of the heavy tourist travel expected through Colorado this year and especially on account of the recent passage of a law providing special tax levy of $\frac{1}{4}$ mill for good roads. Beginning with 1916, this will add about \$625,000 yearly to the highway fund from the state license tax on motor vehicles and from other sources. State Highway Commissioner Thomas J. Ehrhart told

the convention that Colorado may reasonably look for 100,000 motor tourists this year, and that this travel will mean ten or twelve million dollars in business. The following officers elected for 1915 are: President, E. E. Sommers, Denver; vice-president, Dr. W. P. Harlow, Boulder; secretary-treasurer, W. H. Emmons, Denver.

Routes Kansas City-Springfield Road—The Kansas City Highway Association, in meeting at Springfield, Mo., this week, announced the route of the Kansas City to Springfield highway. The new road will run through Bolivar, Newmans, Osceola, Clinton and other Ozark valley towns to the metropolis at the western end of the state. The cost of the road, which will be of rock, is estimated at from \$1,000 to \$1,500 a mile.

To Advertise Route with Movies—Plans to make extensive use of moving picture films to advertise the scenic advantages of the Pike's Peak Ocean-to-Ocean highway across Colorado during this year were made at the annual convention of the Colorado division of this route, the Lincoln Highway Association of Colorado. Additional improvements will also be made at many points along this road through the Rockies, and thorough marking will be provided for the benefit of visiting motorists. This new transcontinental highway will be carefully marked from Terre Haute, Ind., to Salt Lake City.

Coming Motor Events

SHOWS AND CONVENTIONS

- January 30—February 6—Minneapolis show.
- January 30—February 6—Show, Columbus.
- February 1-6—Show, Louisville, Ky.
- February 2-6—Show, Kalamazoo, Mich.
- February 3-6—Show, St. Joseph, Mo.
- February 4-6—Show, Marinette, Mich.
- February 6-13—Show, Hartford, Conn.
- February 8-13—Show, Salem, Mass.
- February 8-13—Show, Wilmington, Del.
- February 8-13—Show, Toledo, O.
- February 8-11—Show, Peoria, Ill.
- February 8-15—Show, Kansas City, Mo.
- February 9-12—Show, Eau Claire, Wis.
- February 10-13—Show, Davenport, Ia.
- February 15-20—Show, Omaha, Neb.
- February 15-20—Show, Grand Rapids, Mich.
- February 15-20—Show, Tacoma, Wash.
- February 15-20—Show, Fort Wayne, Ind.
- February 16-18—Show, Bloomington, Ill.
- February 18-20—Show, Racine, Wis.
- February 22-27—Show, Duluth, Minn.
- February 23-27—Show, Ft. Dodge, Ia.
- February 23-27—Show, Syracuse, N. Y.
- February 24-27—Show, Freeport, Ill.
- February 24-27—Show, Battle Creek, Mich.
- February—Show, Rockford, Ill.
- March—Show, Shelbyville, Ind.
- March 6-13—Show, Boston, Mass.
- March 8-13—Show, Des Moines, Ia.
- March 13-20—Show, Harrisburg, Pa.

CONTESTS

- * February 22—Vanderbilt cup race, San Francisco, Cal.
- * February 27—Grand prize road race, San Francisco, Cal.
- March 17—Road race, Venice, Cal.
- * May 29—500-mile speedway race, Indianapolis, Ind.
- * June 9—200-mile race, Galesburg, Ill.
- June 19—Chicago speedway race.
- June 26—300-mile race, Sioux City, Ia.
- * July 4-5—Speedway races, Tacoma, Wash.
- August 20-21—Elgin road races.
- * Sanctioned by A. A. A.

Utah, by the first of May. At these two points, the route connects with established and well-marked highways. The following officers were elected for the coming year: President, J. H. Rouze, Burlington; vice-president, Judge J. W. Deane, Aspen; secretary-treasurer, A. W. Henderson, Colorado Springs, who succeeds himself.

Long Trip In Cole—E. E. Davis of Dennison, Tex., arrived in Boston last week and called at the Cole agency to tell the salesmen that he had made 2,530 miles in a six-cylinder Cole and that the air pumped in the tires in Texas was still in them despite the hard traveling over many roads covered with snow and ice.

To Build Private Speedway—Cortland F. Bishop of New York is considering a plan to build a private motor speedway on his large estate in the Berkshires and already has asked contractor M. L. Camarco of Lee to give him an estimate of the probable cost. The track would be wholly on Mr. Bishop's property and will be 2700 feet in length. If the plan goes through, Mr. Bishop will have a racing car built with which to practice on the track.

Oregon Farmers to Build Road—Farmers in the northwestern part of Umatilla county, Ore., will build a hard surface road from the German Hall to the Cold Spring landing on the Columbia River, a distance of 18 miles. The expense of the survey will be borne by the farmers interested who are prepared to spend as high as \$15,000 a mile to build a permanent road. The purpose is to make it possible to transport wheat to the river by motor trucks and trailers.

Votes \$1,000 for Road Signs—Fresno county will cooperate with the California State Automobile Association in the work of placing guide signs throughout the county for the benefit of the thousands of tourists who will pass through the San Joaquin valley this year going to and from the expositions at San Francisco and San Diego. The supervisors at a recent session granted the sum of \$1,000 to the officials of the motoring association who are putting up the signs.

Fresno to Stage Races May 1—Motor races are to feature the California Raisin Day celebration, Fresno's annual festival which attracts a great deal of attention throughout the state each year. Plans to bring some of the most famous drivers in the profession to Fresno were completed at the meeting of the Fresno County Raisin Day Festival Commission held last Saturday, and a committee was appointed to confer with the directors of the Fresno County Agricultural Association on the matter of a purse. As the Raisin Day celebration has been planned for April 30, it is the intention of the members of the committee to stage the races May 1.

Tacoma Races Are Sanctioned—Tacoma will be on the racing map again in 1915. The sanction for the speedway races has been received from the American Automobile Association and the dates, July 4 and 5 have been decided upon. The course has been widened to a full 50 feet on the straightaways and 60 feet on the curves, and is now ready for surfacing. Secretary George Dunn will be in San Francisco for the two big races in February and expects to sign up a number of the drivers to take part in the Tacoma races. Entry blanks are now in the hands of the printers. The only change from the 1914 card is the 450 cubic inch displacement limit.



Among the Makers and Dealers



CAPITAL Stock Is Doubled—The capital stock of the Auto Body Co., Lansing, Mich., has been increased from \$250,000 to \$500,000.

Leaves Yuster Axle Co.—Edgar E. Muller has resigned as assistant general manager of the Yuster Axle Co., Cleveland, O., to join the sales force of the Cleveland Varnish Co.

Kelly Truck Company Enlarging—Work has been started on another addition to the plant of the Kelly Motor Truck Co., Springfield, O. One addition was completed only a few days ago. The latest addition will be 50 by 260 feet, of reinforced concrete construction.

J. W. Drake on Legislative Committee—Col. Charles Clifton, president, has appointed J. Walter Drake, sales manager of the Hupp Motor Car Co., a member of the legislative committee of the National Automobile Chamber of Commerce. The other members are: H. H. Rice (Waverley), chairman, and J. I. Farley (Auburn).

New Buildings for Continental Motors—Several temporary frame buildings are to be added to the Muskegon, Mich., plant of the Continental Motor Mfg. Co., and when they are completed it is expected that several hundred men will be added to the present working force, which now numbers 1,200 men. The first addition to be added is a machine shop, 60 by 100 feet, and about 100 men will be employed in it.

Reo Truck Assets \$1,028,312—Assets of the Reo Motor Truck Co. are \$1,028,312.26 for the fiscal year ending August 31, 1914, according to a report of the Reo company, just issued. This includes capital stock issued, \$937,250, and a surplus of \$91,062.26. The capital assets aggregate \$185,072, which includes land and buildings valued at \$88,520; office furniture and factory equipment at \$77,443; patterns, dies, jigs and tools at \$18,431, patents and good will at \$250,000.

More Than 200 Cars Listed—There are more than 200 passenger cars and trucks listed in the twelfth annual handbook just issued by the National Automobile Chamber of Commerce, New York. The book, the standard authority on the products of American manufacturers, gives illustrations and specifications of the principal makers of motor cars of this country. That comparison by buyers may be easy and accurate, all cars are shown with uniform list of details of construction.

Approve \$3,000,000 Stock Issue—At the annual meeting of the stockholders of the Republic Rubber Co., they approved of the issuance of \$3,000,000 of preferred stock, but formal action will not be taken until the special meeting to be held some time in February. It was stated that \$2,500,000 will be used to replace stock of this character still outstanding and which matured September 1, 1914, while the remaining \$500,000 will be used for future extensions of the plant.

Milwaukee Mayor Heads Tire Company—The Wisconsin Tire Co., incorporated recently with prominent officials of the city of Milwaukee as members, has elected the following officers: President, Dr. G. A. Bading, mayor of Milwaukee; vice-president, J. A. Werwinski, South Bend, Ind.; secretary, Louis M. Kotecki, city comptroller; treasurer, Joseph P. Carney, city treasurer; general manager, Fred G. Simmons, commissioner of public works. The company is organized to distribute motor car tires and tubes direct to owners. The tires will be

trade-marked "Badger" and will be sold at wholesale prices. The office and distributing station is located at 188-192 Eighth street, in the Wisconsin Garage.

Adds \$1,000,000 to Capital Stock—The Federal Rubber Mfg. Co. of Milwaukee has filed an amendment to its articles of incorporation, increasing its capital stock from \$2,000,000 to \$3,000,000.

Start Work on Jones Cars—The Jones Motor Car Co., which was recently organized at Wichita, Kan., to make the Jones six-cylinder cars, has started operation in its new plant at 210 West Douglas avenue, with a force of 30 to 40 men for the present. V. T. Sevier, formerly of the Farmers and Bankers Life Insurance Co., has been appointed sales manager, E. E. Stroup his assistant, and Charles H. Smith advertising manager.

L-P-C Capital Stock Increased—At the annual meeting of the stockholders of the L-P-C Motor Co., William Mitchell Lewis

was elected president; J. M. Cram, vice-president; F. S. Gordon, secretary, and G. B. Wilson, treasurer. These officers and Rene M. Petard were elected directors for the current year. The capital stock of the company was increased from \$250,000 to \$350,000. It was announced at the meeting that during the first 9 months of operation since the company was started 380 cars were made and sold.

Sternberg Trucks for Warring Nations—The Sternberg Motor Truck Co., West Allis, Milwaukee, is making final deliveries on an order for 100 Sternberg motor trucks for the allied armies of Europe. Most of the trucks are consigned to Russian ports. Each car has been given a 300-mile test with rated capacity load. An interesting feature of the tests was the fact that each truck made frequent trips from West Allis to Waukesha, Wis., where the Sternberg motors are built by the Waukesha Motor Co., carrying scrap on the out trip and finished motors on the return trip.



Recent Incorporations



Albany, N. Y.—The National Auto Service Co.; dealers in property of all kinds, agents for printing and advertising; incorporators, A. J. Seaton, F. W. Seaton and W. H. McGarry.

Albany, N. Y.—William and Tschanz Auto Co.; incorporators, Emmieke Tschanz, Annie Tschanz, Emma Williams and Edward P. Keogh.

Albany, N. Y.—The Stuyvesant Heights Motor Car Service; incorporators, Vincent Fogler, Joseph Mann, Buxbaum and Schoenner.

Albany, N. Y.—The Michel-Schneider Garage; incorporators, H. G. Schneider, G. W. Schneider, E. H. Michel.

Albany, N. Y.—The Motor Owners Supply Co., manufacturers of motor cars and supplies; incorporators, H. H. Mansell, H. G. B. Martin and S. C. Seymour.

Albany, N. Y.—California Beacon Miniature Electric Co., manufacturer motor supplies, electrical apparatus, etc.; incorporators, W. Rosin, S. I. Rosin, M. L. Kaplan.

Albany, N. Y.—Gilliet-Johnson Co., dealers in motor vehicles; incorporators, Frank D. Gilliet, Cassie L. C. Johnson and Albert J. Johnson.

Albany, N. Y.—Bay Shore Motor Sales Co.; incorporators, Chas. M. Hart, Chas. F. Hart and Arthur B. Capron.

Boston, Mass.—The Metz Company, manufacturers of motor cars; incorporators, N. F. Ernest.

Buffalo, N. Y.—Iroquois Garage; incorporators, Edward D. Emerson, Chas. C. Page and Francis J. Handel.

Boston, Mass.—Henshaw Motor Co.; incorporators, Charles S. Henshaw, Harry L. A. Hodgdon, Edward Henshaw.

Buffalo, N. Y.—Suncott Motor Sales Co., auto accessories; incorporators, P. A. Sullivan, R. A. Kellogg, D. E. Knowlton.

Brooklyn, N. Y.—Stuyvesant Heights Motor Car Service; incorporators, Vincent Fogler, Joseph Fogler and Jos. F. Brezek.

Brooklyn, N. Y.—I. Zagon & Co., motor cars and accessories, also to manufacture and deal in jewelry, diamonds, etc.; incorporators, Isidor Zagon, Rae Zagon and Jacob Glaessir.

Brooklyn, N. Y.—Bay Ridge Rubber Corporation, manufacturers of inner tires, tubes, etc.; incorporators, Michael Seltzer, Morton DeWalt-hoff and Florence Wimble.

Cleveland, Ohio—The University Circle Garage & Sales Co., a garage and sales agency; incorporators, E. C. Pliske, V. E. Davis, H. E. Downing, M. H. Gallagher and H. F. Allen.

Cleveland, Ohio—The Levett Auto Livery Co., a taxicab business; incorporators, F. M. Levet, J. E. Levet, Hazel Levet and A. F. Roehl.

Canton, Ohio—The Little Giant Starter Co., makers of starters and accessories; incorporators, E. D. Myers, J. H. Binns, W. L. Vance, R. G. Flack and C. W. Metzger.

Detroit, Mich.—Dadco Auto Service Co.; incorporators, Alfred C. Waters, Wm. F. Cornell, W. C. Farrington and Chan E. Kinbel.

Detroit, Mich.—Scripps-Motor Co.; incorporators, Wm. E. Scripps, Ray V. Warman, Andrew J. Downey, Theodor F. W. Meyer.

Detroit, Mich.—National Trimming Co.; incorporators, B. B. Wetsman, James E. Kinney, Joseph Wetsman and Frank Shepard.

Detroit, Mich.—Detroit Speedway Club, principal asset 400-acre tract of land in Encorse township for club house, ball park and speedway.

Dover, Del.—The National Service Corporation, motor cars and appliances.

Eddyville, N. Y.—The Gas-Electric Motorbus Corp., manufacturers of motorbuses; incorporators, Roland R. Conklin, Stanley L. Conklin and Harold B. Weaver.

Jackson, Mich.—The Jackson Auto Trailer Co.

Jackson, Mich.—The Commonwealth Motor Specialty Co.

Lynn, Mass.—Tripp Mfg. Co., Motor accessories; directors and officers, C. K. Tripp, David H. Pingree and J. R. Wellman.

Middletown, Conn.—Fisk Garage Co.; incorporators, John L. Fisk, J. A. Fisk and Charles L. Fisk.

Middletown, Conn.—Fisk Garage Co.; incorporators, John L. Fisk, Jennie A. Fisk and Chas. L. Fisk.

Milwaukee, Wis.—Milwaukee Steel Type & Die Co.; incorporators, A. C. Moeller, Fred H. Scheiner and Emmet Horan, Jr.

Milwaukee, Wis.—Boggs-Dietz Electric Co., makers and repairers of electrical devices; incorporators, H. F. Boggs and E. L. Dietz.

Milwaukee, Wis.—Wisconsin Automobile Business Assn. of Milwaukee; incorporators, H. E. Wilson et al.

Morristown, N. J.—The Cain-Henry Motor Co.; incorporators are Isaac A. Cain, Ernest S. Cain, Laura E. Henry and Charles C. Henry.

Mount Vernon, N. Y.—The Michel-Schneider Garage; incorporators, Edw. H. Michel, Geo. W. Schneider and Henry G. Schneider.

New York—Advance Alert Auto Co.; incorporators, Geo. Reif, Edgar M. Lichter and Mildred A. Murray.

New York—The Reliance A. C. Co., manufacturers of tires and tubes; incorporators, E. Long, W. J. Gill, Jr., and J. W. Anderson.

New York—The Heina Tire Co., tires, etc.; incorporators, Wm. M. Heina, Ernest V. Derks and Edw. A. Kammler.

New York—The Auto Trunk and Acme Suit Case Mfg. Co.; incorporators, Julius Schwartz, Benj. Ammerman and Abr. Zieve.

Rosetown, Sask.—The Rosetown Machine & Auto Co., to manufacture motor trucks and motor cars.

St. Louis, Mo.—Gillham Motor Co.; incorporators, Frank R. Tate, Fred C. Gillham, Henry W. Blodgett, Jr.

Syracuse, N. Y.—Syracuse Motor Vehicle Trade Corporation; incorporators, Ferdinand Crosby, Stewart W. Munroe, George W. Bartlett.

Trenton, N. J.—The James McLaughlin Auto Co.; incorporators, James McLaughlin, A. M. McLaughlin, Earl F. Bosworth.

Trenton, N. J.—The Air Spring Tire Co., manufacturers and dealers in motorizing supplies; incorporators, J. D. Milne, W. E. Meyer, E. H. Hints and W. G. Smith.

Utica, N. Y.—National Auto Service Co.; incorporators, Albert J. Seaton, Frank J. Seaton and Wm. H. McCrory.

Utica, N. Y.—Utica Automobile Trade Assn.; incorporators, A. A. Ledermann, Geo. C. Donahue and Wm. F. Carroll.

Wilmington, Del.—National Service Corporation, to manufacture, sell and deal in motor cars and appliances; incorporators, C. J. Jacobs, C. H. Bishop and H. W. Davis.

Brief Business Announcements

BESSEMER, Mich.—Albert Swanson has purchased M. Cavalette's interest in the Running & Cavalette Garage.

Harbor Beach, Mich.—A garage has been opened on Huron avenue by Frank E. Mahan and Fred Gertenschlager.

Dubuque, Ia.—The Dubuque Tire and Vulcanizing Works is a new concern which has located at 1447 Clay street. L. Floyd Huntington is the manager.

San Francisco, Cal.—Hughson & Merton, Inc., has been appointed Pacific coast distributor for the Gray & Davis Ford starting and lighting devices.

Winchester, Ky.—W. R. DePue has opened the Highland Garage here and is in the market for agency connections. He intends to handle three grades of cars—low, medium and high priced.

New York—James A. Abeles has succeeded Carl Kaufman, who retires, as general manager and treasurer of the Motor Car Equipment Co., with general offices and warehouse at 55 Warren street. Mr. Abeles was formerly secretary of the company and will also continue in that capacity.

Columbus, O.—At a meeting of the electric car dealers, held recently, the Columbus Electric Automobile Dealers' Association was formed with F. E. Avery, president; H. D. Brasher, vice-president; and L. M. Browne, secretary-treasurer. H. S. Chalfant, secretary of the National Electric Automobile

Dealers' Association, was present to aid in the organization of the association which is affiliated with the national association.

Tacoma, Wash.—The General Motors Truck Co. has established a direct factory branch here with George A. Sabourin in charge.

Toledo, O.—The La Due Auto Top Co. has secured the agency for the new Ford limousine top known as the Daisy and made by Paul E. Heinsohn, Ionia, Mich.

Duluth, Minn.—An agency will be opened here by the Fisk Rubber Co., and Fred W. Neumann, manager of the Duluth Auto Supply Co. during the last 4 years, will be in charge.

St. Louis, Mo.—An addition is being built to the local branch of the Ford Motor Co. The new building, a one-story structure 40 feet by 50 feet, will be used as a storage room for parts. The overcrowding of the new five-story building opened here this fall caused the need for the expansion.

Milwaukee, Wis.—The new organization of motor car supply and accessory dealers which has been in process of formation for several weeks, has now been effected and the association incorporated under the name of Wisconsin Automobile Business Association of Milwaukee. There is no capital stock. A credit bureau will be maintained to watch for dead-beats. The big tire companies having branches in Milwaukee are represented in the membership. Officers have been

elected as follows: President, Jesse A. Smyth; secretary, Roland Moeller; treasurer, Oscar F. Fischbeck, all of Milwaukee.

Marcellus, Mich.—Charles Seigel has disposed of his interest in the local Maxwell agency to Don Kuhn. The name of the agency is now Thomas & Kuhn.

Grand Rapids, Mich.—Sauerberg & Cummings is the name of a new repair and painting shop company which has its quarters at 224 North Division avenue.

Detroit, Mich.—A partnership has been formed between J. Wetzel and Charles M. Hall, who was formerly manager of the Parish Mfg. Co., Detroit. They will handle accessories.

Seattle, Wash.—Jack M. Osmond has opened a service station for Mitchell and other makes of machines at 1722 and 1724 Broadway. The Mitchell agency has withdrawn from Seattle.

Milwaukee, Wis.—At the annual meeting of the Wisconsin Retail Automobile Dealers' Association, held in Milwaukee during the seventh annual show, the following officers were elected: President, Nathan Haessly, Theresa; vice-president, L. F. Schoelkopf, Madison; secretary and treasurer, H. A. Apple, Milwaukee; directors, E. W. Clark, Fond du Lac; H. E. Zastrow, Portage; O. A. Kalvestran, Gays Mills; Rudolph Hokanson, Madison. The association plans a strong legislative fight during the present session of the Wisconsin legislature and will resist

Recent Agencies Appointed by Motor Car Manufacturers

PASSENGER CARS

Town	Agent	Make	Town	Agent	Make
Anoka, Minn.	J. H. Ward	Lexington-Howard	Conroy, Iowa	Geiger & Martinson	Lexington-Howard
Ansonia, Ohio	James Lephart	Maxwell	Cincinnati, Ohio	Cincinnati Motor Truck Co.	Lexington-Howard
Alexander, Ohio	S. S. Anderson	Empire	Chicago	T. C. Vawter	Lexington-Howard
Anglim, Mo.	E. R. Goddard	Metz	Columbus, Ohio	F. Mayer & Son	Lexington-Howard
Atlanta, Ga.	Arlington Motor Co.	Remington	Clarksburg, W. Va.	J. M. Shields	Lexington-Howard
Burlington, Iowa	Farmers' Motor & Supply Co.	Lexington-Howard	Detroit, Mich.	Addison Garage	Monarch
Birzito, Mo.	Chas. A. Arnold	Pullman	Detroit, Mich.	Addison Garage	Empire
Boston, Mass.	E. A. Gilmore	Allen	Detroit, Mich.	Addison Garage	Kisselkar
Boston, Mass.	E. Y. Simpson	Milburn	Detroit, Mich.	Edw. I. Rumsey	Milburn
Boston, Mass.	R. W. Vining	Paterson	Detroit, Mich.	The Ohio Elec. Sales Co.	Ohio
Boston, Mass.	William Hilliard	Pathfinder	Denver, Colorado	Geo. E. Hannan	Allen
Boston, Mass.	Leo Spiegelmilch	Empire	Delaware, Ohio	H. W. Lennox	Empire
Boston, Mass.	R. W. Vining	Patterson	Delaware, Ohio	C. A. White	Studebaker
Boston, Mass.	Brown-Apperson Co.	Apperson	Dexter, Ohio	Patton & Patton	Empire
Boston, Mass.	Eads-Loud Co.	Premier	Edison, Ohio	C. O. Wells	Empire
Buffalo, N. Y.	Poppenberg Motor Car Co.	Apperson	Effingham, Ill.	Geo. F. Walters	Metz
Casco, Me.	Cook-Hall Co.	Maxwell	Elksville, Ill.	C. T. Bass	Pullman
Cleveland, Ohio	The Eckenroth Sales Co.	Franklin	Fall River, Mass.	Thomas Paquin	Maxwell
Cleveland, Ohio	Cleveland Motor Car Co.	Haynes	Fredericktown, Ohio	C. A. Berry	Empire
Cleveland, Ohio	Hudson Stuyvesant Co.	Hudson	Greenwich, Conn.	Enders & Abrams	Detroiter
Cleveland, Ohio	Elsman Auto. Co.	Apperson	Grand Rapids, Mich.	Remington Sales Co.	Remington
Cleveland, Ohio	Elsman Auto. Co.	Imperial	Galeton, Pa.	Otto C. Mosch	Detroiter
Cleveland, Ohio	Elsman Auto. Co.	Lewis	Holstein, Mo.	E. F. Litchtenberg	Metz
Cleveland, Ohio	Neighbors Motor Co.	Dodge	Hamilton, Ohio	West Side Motor Co.	Reo
Cleveland, Ohio	Auto Sales Co.	Reo	Hawley, Pa.	Graham Watts & Son	Detroiter
Cleveland, Ohio	Euclid Square Supply Co.	Saxon	Hillsboro, Ohio	Barrett Motor Co.	Maxwell
Cleveland, Ohio	Homer D. Haupt	Milburn	Hebron, Ohio	C. A. Pence	Hupmobile
College Corners, Ohio	Chas. Kirkpatrick	Maxwell	Hebron, Ohio	C. A. Pence	Westcott
Canal Winchester, O.	T. G. Glick	Empire	Indianapolis, Ind.	Cole Sales Co.	Cole
Canal Winchester	Chas. Christ	Empire	Illasco, Mo.	Geishe Auto Co.	Cartermobile
Coshocton, Ohio	Crowthers Auto Sales Co.	Maxwell	Johnstown, Ohio	Patton & Ross	Ford
Coshocton, Ohio	Crowthers Auto Sales Co.	Chevrolet	Kingston, Pa.	Keystone Motor Car Co.	Detroiter
Circleville, Ohio	Spangler Auto Co.	Studebaker	Los Angeles	The English Motor Car Co.	King
Circleville, Ohio	Clifton Auto Sales Co.	Buick	Lancaster, Ohio	The Martin Hdw. Co.	Studebaker
Circleville, Ohio	Noecker & Brehmer	Maxwell	Lancaster, Ohio	The Martin Hdw. Co.	Dodge
Circleville, Ohio	Jos. Metzger	Ford	Lancaster, Ohio	Star Garage	Maxwell
Campello, Mass.	Franklin Motor Co.	Detroiter	Lancaster, Ohio	L. E. Huddle	Buick
Cressona, Pa.	H. E. Zarbe	Detroiter	London, Ohio	Madison County Auto Co.	Briscoe
			London, Ohio	Madison County Auto Co.	Interstate

particularly the proposal to increase the annual license fee for motor car dealers from \$10 to \$25.

St. Louis, Mo.—The Vehicle Top and Electric Co., 3414 Lindell avenue, has been appointed local agent of the Remy Electric Co.

Salt Lake City, Utah.—W. B. Hamilton has opened a new supply and accessory store here. He formerly was with the Bertram Motor Supply Co. in this city and San Diego, Cal.

Marshall, Mich.—A motor car salesroom and garage will be opened in the Brewer building by O. L. Linn and R. S. Scott, who have taken the agency for the Briscoe and Argo cars.

Kansas City, Mo.—The local Stearns distributor, having Kansas, western Missouri and northern Oklahoma as its territory, has reincorporated under the name of the Scarritt Motor Car Co., the old firm name being the White Motors Co.

Rock Island, Ill.—The partnership of the Yeggy-Don Co., operating a garage and agency in Rock Island, was dissolved this week, Elbert G. Don, junior member, purchasing the interests of G. A. Yeggy.

Detroit, Mich.—The accessory business conducted by McLean & Freeman at 1575 Woodward avenue has been taken over by E. Mack Morris, formerly assistant secretary of the Northern Motor Car Co., and also assistant sales manager of the E-M-F Co.

Seattle, Wash.—J. C. C. Morris, formerly manager of the Johns-Manville Co., of Seattle, Wash., for the entire northwest, has closed arrangements with the Moon Motor Car Co., of St. Louis, Mo., whereby he handles this entire territory, for Moon cars, appointing his own agents, and assuming

every detail of the service and management in Washington, Oregon, Idaho and western Montana.

Alma, Mich.—A garage and salesroom has been opened in the Spinney block by Milton M. Ferrigo, agent for the Studebaker cars.

Indianapolis, Ind.—A large store for the sale of tires and accessories has been opened at 213 South Illinois street by George F. Kreitlein.

Seattle, Wash.—H. F. Daniels has opened a repair shop at 1107 East Pike street, operated under the name of the Lions Auto Repair Shop and conducted on a co-operative basis by Daniels and his employees. The shop specializes in Ford car repair work.

Kansas City, Mo.—The Kansas City White Co. has been organized with headquarters at 928 East Fifteenth street to handle the White passenger cars and motor trucks in Kansas City and vicinity. John Toole, factory representative for the White Co. in the state of Kansas during the last 7 years, is manager of the new concern.

Hartford, Conn.—The Ennis Auto Top Co. has started in the business of motor car painting and trimming at 436 Capitol avenue. Ed C. Ennis, who is at the head of the company, was manager of the trimming and upholstering department of the Pope Mfg. Co.

Columbus, Wis.—The G. D. Roberts Co., Columbus, Wis., which has been operating a garage in connection with its vehicle and implement business, has sold its motor car department to Schultz & Harder, who take possession February 1. Frank Schmeid, for 6 years member of the Roberts firm, in charge of the garage, has disposed of his interest and intends to go into the garage busi-

ness on his own account. A new building will be erected in Columbus at once for his occupancy.

Detroit, Mich.—G. C. Brown, formerly with the Buffalo Electric Vehicle Co., is now with the engineering department of the Packard Motor Car Co.

Indianapolis, Ind.—J. M. Ward, for 2 years factory representative for the United States Tire and Rubber Co., has been made manager of the company's local sales branch.

Grand Rapids, Wis.—H. D. Mintz has purchased the City Garage from Jacobsen & Holliday, and takes immediate charge. Mr. Mintz will install a complete new machine shop and vulcanizing equipment and place experienced mechanics in charge of repair and tire shops.

Madison, Wis.—The Branch Battery and Carbon Co., Madison, Wis., has established a direct factory branch in Chicago. The company is capitalized at \$50,000 and the articles filed in Illinois give the Chicago interest at \$1,500. F. M. Brown is president and C. T. Ellis secretary.

Detroit, Mich.—At the annual meeting of the stockholders of the Detroit Brass Works, J. W. Fussey was re-elected president; A. L. Hanson, vice-president; E. B. Whitcomb, treasurer; and G. C. Hall, secretary. These officers, with E. D. Bronner and O. P. Benjamin, constitute the board of directors.

Clinton, Wis.—Charles McCommons, of Milwaukee, has formed a partnership with A. Terwilliger, of Terwilliger & Son, local Buick agent, to represent the Dodge car in this territory. The new firm will be known as Terwilliger & McCommons. Mr. Terwilliger retains his interest in the firm of Terwilliger & Son, who continue to represent the Buick.

Recent Agencies Appointed by Motor Car Manufacturers—Continued

PASSENGER CARS

Town	Agent	Make	Town	Agent	Make
London, Ohio.....	Madison County Auto Co.....	King	Rochester, N. Y.....	Pritchard-Lyon Motors Corporation.....	Lexington-Howard
Lewiston, Pa.....	J. M. Bratton.....	Detroiter	St. Louis County, Mo.	Chas. S. Kenamore.....	Pullman
Lebanon, Pa.....	Lebanon Auto & Garage Co.....	Detroiter	Saginaw, Mich.....	Electric Vehicle Service Co.....	Argo
Los Angeles, Cal.....	Lynn C. Buxton.....	Lexington-Howard	Saginaw, Mich.....	Electric Vehicle Service Co.....	Borland
Marshall, Mich.....	O. L. Linn & R. S. Scott.....	Argo	Saginaw, Mich.....	Electric Vehicle Service Co.....	Broc
Madison, Ill.....	A. V. Wallace.....	Metz	Springfield, Mass.....	Harrington-Gifford Co.....	Hudson
Marshall, Mich.....	O. L. Linn & R. S. Scott.....	Briscoe	St. Jacobs, Ill.....	St. Jacobs Hardware Co.....	Pullman
Montreal	The Montreal Motor Sales Reg.....	Dodge	Springfield, Ohio.....	King Garage	Studebaker
Marion, Ohio.....	Wm. Rhoades	Maxwell	Stamford, Conn.....	The Motor Sales, Inc.....	Lexington-Howard
Marshfield, Wis.....	Hugo Wegener	Kissel	Sunbury, Ohio.....	T. B. Rosencrans	Ford
Marshfield, Wis.....	Hugo Wegener	Grant	Springfield, Ill.....	The R. Haas Electric & Mfg. Co.....	Lexington-Howard
Mullica Hill, N. J.....	Jos. P. Stratton.....	Detroiter	St. Louis, Mo.....	Lindell Motor Car & Repair Co.....	Lexington-Howard
Macon, Mo.....	Reichel Motor Co.....	Pullman	Toledo, Ohio.....	Grant Motor Sales Co.....	Lexington-Howard
Mt. Vernon, Ohio.....	Auto Inn	Ford	Troy, Mo.....	J. M. Elliott.....	Pullman
Mt. Vernon, Ohio.....	Auto Inn	Overland	Toms River, N. J.....	A. W. Brown.....	Detroiter
Mt. Vernon, Ohio.....	A. L. Rawlinson.....	Empire	Urbana, Ohio.....	Englehart's Garage	Maxwell
Mechanicsburg, Ohio.....	Culbertson Bros.....	Ford	Vancouver, B. C.....	The Begg Motor Co.....	Dodge
Montoursville, Pa.....	A. Z. Young.....	Detroiter	Woburn, Mass.....	J. H. Bates & Son	Overland
Maysville, Mo.....	H. O. Williams.....	Lexington-Howard	Worcester, Mass.....	White Motor Co.....	White
Millville, N. J.....	Troth & Keen	Detroiter	Wilmington, Ohio.....	Wilmington Auto Co.....	Maxwell
New York.....	The Garland Auto Co.....	Interstate	Wilmington, Ohio.....	Wilmington Auto Co.....	Buick
Noble, Ill.....	Ernest Warren	Metz	Woodstown, N. J.....	E. G. Peterson	Detroiter
New Baden, Ill.....	J. J. Kock	Pullman	Wheeling, W. Va.....	Union Auto Co.....	Briscoe
Neenah, Wis.....	Harvey Brown	Oldsmobile	Wilkinsburg, Pa.....	Central Garage, Inc.....	Lexington-Howard
Newark, Ohio.....	Hess Auto Co.....	Ford	Worcester, N. Y.....	Louis Feilinger	Detroiter
Newark, Ohio.....	Hess Auto Co.....	Dodge	Zanesville, Ohio.....	Wedge Garage	Cole
Newark, Ohio.....	Samuel Forsythe	Studebaker	Zanesville, Ohio.....	Wedge Garage	Paige
Newark, Ohio.....	Samuel Forsythe	Briscoe	Zanesville, Ohio.....	Chas. Fritz	Studebaker
Newark, Ohio.....	C. W. Stevens	Maxwell	Zanesville, Ohio.....	Chas. Fritz	Hudson
New York City.....	Lexington Sales Co.....	Lexington-Howard	Zanesville, Ohio.....	Harvey's Garage	Ford
Orient, Ohio.....	T. D. Poulsen	Empire	Zanesville, Ohio.....	H. Schubach	Maxwell
Palmyra, Mo.....	C. L. Bishop	Cartermobile			
Philadelphia, Pa.....	W. Taylor	Apperson			
Philadelphia, Pa.....	R. S. Pullen	Milburn			
Pen Argyl, Pa.....	Joel F. Batt	Detroiter			

COMMERCIAL CARS

Columbus, Ohio.....	Miller-Main Garage	Koehler	Cleveland, Ohio.....	The Auto Sales Co.....	Reo
Los Angeles, Cal.....	W. E. Sparks	Koehler	Boston, Mass.....	R. E. Taylor Co.....	Garford
Monson, Mass.....	Monson Garage	Koehler	Ogden, Utah.....	R. E. Taylor Co.....	Willys Utility
Ansonia, Conn.....	Ansonia Garage	Koehler	Boston, Mass.....	Fell-Wright Co.....	G. M. C. Trucks

The Motor Car Repair Shop

THE other day a comparatively new car was seen running with the front axle sadly out of line, and the driver apparently ignorant of the fact. Steering could not have been a very easy matter under the circumstances and the tires were scraping over the road. The trouble was due to the fact that one of the front spring stirrups A, Fig. 1, had become loose and had slipped ahead on the spring about 3 inches. As the axle is held to the spring, and therefore maintained in its proper relation to the chassis, by this stirrup, it can readily be seen that the tire was receiving a great deal of sliding wear in addition to the usual rolling wear. This sliding action in combination with rolling would ruin a casing in a short time. Of course, obstructions in the road would tend to slide the stirrup back toward its normal position on the spring, and this action also would get in its effect in mutilating the tire.

It would have been a comparatively simple matter for the owner of the car to have had this slight trouble repaired, had he been aware of it. The average type of spring has a center plate B, which is bolted to the body of the spring through the leaves. The stirrups bolt through the spring seat on the axle and on either side of this center plate. Thus, the latter serves to center the axle and prevent any relative motion of axle and spring. It is probable that the bolt or bolts holding the plate to the spring had become sheared off, allowing the stirrups free movement on the spring.

It is a good idea to inspect all such parts of a car occasionally, and from the side, note whether or not the wheels are in line. Also with a wrench tighten the nuts holding the spring clips.

Save the Car Whenever You Can

There are two classes of drivers—the type which recognizes that a car is a piece of machinery that must have some care and consideration, and that which does not care what happens to the car or how it gets its lubrication or adjustment. The best car in the world will last the latter type but a few months before it is in a sad condition. The average good car will be a good and obedient servant for the first class of driver for a long and reasonable length of time.

For the motor car is like everything else—it must have care. You cannot expect to run it day and night without paying considerable attention to the proper oiling of the parts and attention to minor defects before they grow into big ones and add to the upkeep.

Every day before using the machine a fairly careful inspection of all essential

Tightening Loose Car Parts

features will pay big dividends in the end. Look at the steering connections to see if they are too loose or rattle. See to the back lash in the steering wheel, and if it is more than about one-eighth turn, adjust the steering gear so that this extra play is taken up. Test the wiring connections to make sure that no terminal has jarred loose, or is ready to break connection. Look at the oil level in the motor. See that there is enough water in the radiator, and glance at the wheels to make sure that they are in alignment.

Of course, nothing may be the matter, but it is best to be on the safe side and to catch any trouble in the making rather than to wait until it actually happens somewhere on the road where it will cost several dollars to get a tow home or to a nearby garage.

Watch the Storage Battery

Winter is a trying time for the storage battery for it is subjected to longer discharge periods, due to the harder starting of the car in cold weather. This is apt to run it down occasionally because in the average case the car is not driven so far nor at so high speeds when it is cold, and the generator does not get a very good chance to build it up.

When recharging becomes necessary it is best to take the battery to a charging station, where it can be rejuvenated as soon as possible. A slow charge of tapering form is desirable, and it may take a day to do it. Therefore, if the inconvenience of cranking by hand is to be avoided, two batteries are desirable, one being on charge, while the other is in service. It is very bad for the battery to leave it without recharging when it has run down so as not to be strong enough to crank the car.

Weekly inspection of the water in it

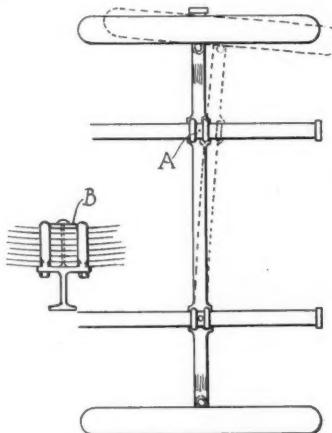


Fig. 1—How the front axle of a car was thrown out of alignment because of the shearing of a spring bolt

should also strictly be adhered to. The liquid in each cell should cover the plates. This can be seen by looking down through one of the vent plug holes. Pure water is the only thing to be added—not acid. Plates which are only partly submerged soon buckle and are ruined with the result that the battery rapidly is rendered useless.

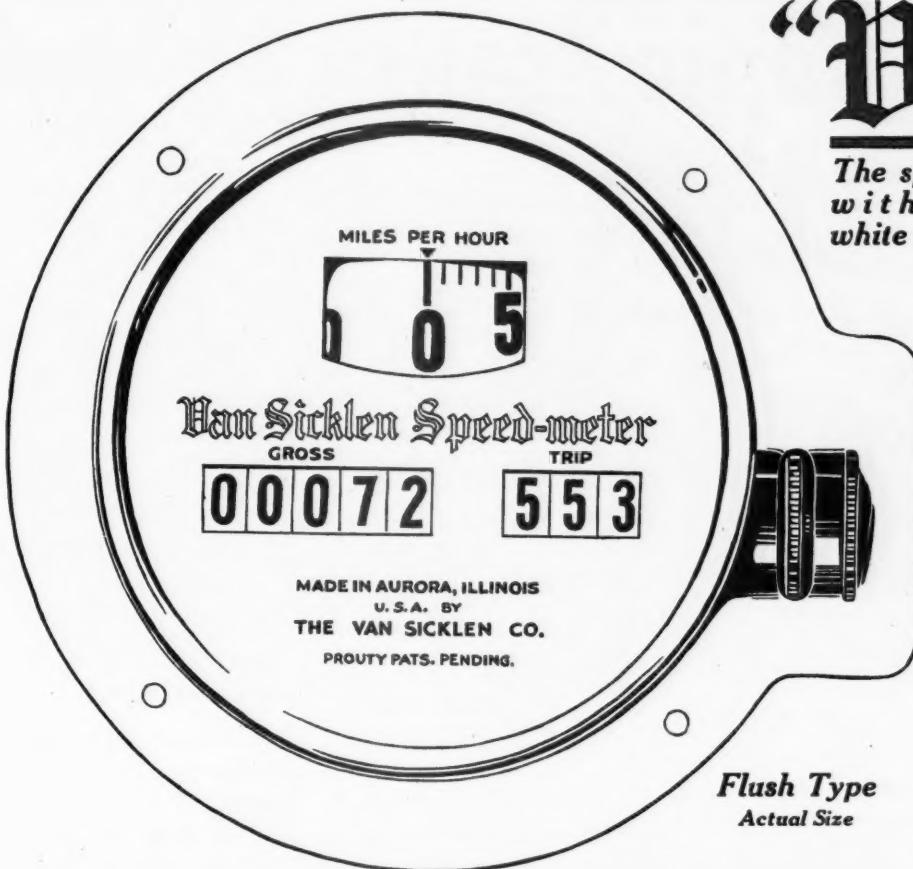
Finding the Positive Wire

In the charging of storage batteries the operator often is puzzled in determining which charging wire is the positive and which is the negative, so that the proper connections may be made. A simple test is as follows: Draw three-quarters of a tumblerful of electrolyte from the battery. Attach a strip of lead to each terminal of the charging line and place the two strips into the tumbler containing the solution. The current then should be switched on and in about 3 minutes the strips of lead should be examined. The one which is brown is attached to the positive side of the charging source and obviously the other side is the negative.

Action in a Storage Battery

A recent visit to the Williard service station in Chicago convinced the writer that owners of cars are responsible to a large extent for much of the battery trouble which is attributed to the generator, cutout, etc. The man in charge of the service station made the statement that owners sometimes add acetic acid, sal-ammoniac, vinegar, salt, hydrochloric acid and any number of other substances, in order to "revive" the battery. Lead storage batteries use a solution of sulphuric acid in water. The addition of foreign matter cuts down the effectiveness of the battery and in many instances it means ruin.

When a battery is used or is standing idle there is chemical action taking place within it. When in use this action is violent as compared with that when not in use. By causing the battery to give off its electrical energy, a substance known as lead sulphate is formed and when this sulphate deposits itself on the plates it cuts down the effectiveness of the battery in proportion to the deposit. Thus, if the plate is entirely covered with sulphate little if any current will be given off. In order to make the battery again fit for use the sulphate must be removed so as to expose clean plates and this is accomplished by recharging or forcing electrical energy into the battery. This again causes chemical action to take place, breaking up the lead sulphate and allowing the electrolyte to act on the clean battery plates and so result in the production of electrical energy.



There isn't a hump in the road big enough to make Van's speed indicator seesaw a tenth of a mile one way or another.

Cuff Van with a hammer—put him on a car that vibrates so your teeth chatter—drive him over as many exposed railroad tracks as you can find—you can't rock his speed dial.

Van doesn't jump, lag or quiver. He moves in a *steady* progression—keeps perfect step with the car—shows instantly the exact speed you are traveling and holds it as long as your car does.

Van comes in two models—Flush Type for cowl-board installation, and Special Bracket Type for Ford cars. He has a unique two-speed reset and other exclusive features of more than usual interest.

Van is fully guaranteed in every particular. Prices and full information on request.

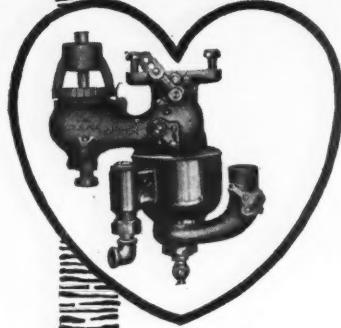
THE VAN SICKLEN COMPANY
AURORA **ILLINOIS**

General Distributors: The Beckley-Ralston Company, Chicago

Western Representative, T. T. Roe, 847 Golden Gate Ave., San Francisco, California

SCHEBLER

The Heart of the Automobile



America's Champion Road Racing Carburetor

SCHEBLER has won more official road races in the last ten years than any other American carburetor.

The Stutz—first among American road racing cars—winner in the last four years of 30 places out of 38 entries—has been equipped with the SCHEBLER Carburetor in every road race entered.

The National—second only to Stutz in road racing honors and winner of 26 places out of 37 entries—won all its races equipped with the SCHEBLER Carburetor.

The Buick—with the third largest number of road racing victories to its credit—30 places out of 49 entries—was invariably SCHEBLER equipped.

The SCHEBLER Carburetor is maintaining the lead today that it has held consistently throughout the last ten years. SCHEBLER has won every road race held thus far this year—Earl Cooper's SCHEBLER-Equipped Stutz taking first place in the San Diego Exposition 305-mile road race—and Dick Clarke winning the Tucson 102-mile event.

Nothing proves the EVERYDAY WORTH of a carburetor—the ability to stand up under most adverse service conditions—more certainly than road racing. SCHEBLER carburetors stand the gaff! Demand a SCHEBLER on your new car.

WHEELER & SCHEBLER
INDIANAPOLIS

INDIANA



When Writing to Advertisers, Please Mention Motor Age.

New Moline-Knight "40"

\$1475

Never before has a Knight been produced at such a low price

To meet the downward tendency in prices, we now offer dealers a big Knight sleeve valve motored car, guaranteed 40 horse power, 5 passenger, 118 wheelbase, weight less than 3,000 lbs., ready for the road, \$1475.

Compare the specifications with any car in its price

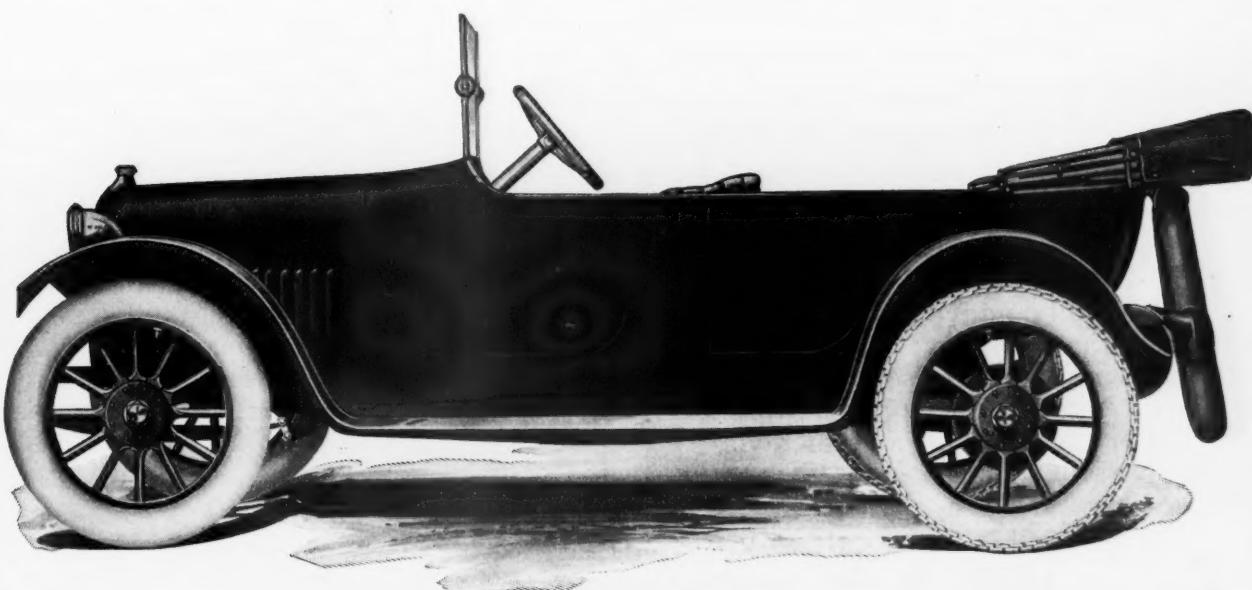
class—then add the proved superiority of the Knight sleeve valve motor and you have a salable car with a ready market.

Complete line—Moline-Knight "40," 5 passenger \$1475; 7 passenger, 50 h. p. limousine \$3800; 5 or 7 passenger touring car \$2500; 2 passenger roadster \$2500; 5 passenger sedan \$3250.

Write or wire for Special Selling Plan

Specifications

Light weight—under 3,000 lbs. ready for the road.
118 in. wheelbase.
Knight sleeve valve motor
Guaranteed 40 h. p.
34x4 tires—non-skid rear.
Power pump.
Five passenger.
Selective, three speed transmission.
High tension ignition.
Left hand drive.
Center control.
Electrically lighted and started.
Screw and nut steering gear.
V shaped radiator.
Thermo-syphon cooling.
Unusually deep, hot riveted pressed steel frame.
Full floating, spiral bevel gear rear axle.
Force feed lubrication.
\$1475.
Write for detailed specifications.



Moline Automobile Company, East Moline, Ill.

KISSELKAR

Every Inch a Car

36-Four - - \$1450

42-Six - - \$1650



Do Not Fail to Ask Yourself These Questions:

Before you buy that new car be sure and consider:—

- 1:—If I want to keep this car how long will it serve me satisfactorily?
- 2:—If I want to sell this car how much will it bring?

Until you are thoroughly satisfied the car you favor is so well and staunchly built that it will be good for at least 50,000 miles of hard usage, DON'T BUY IT.

Unless you are fully assured that the manufacturers are responsible and likely to remain in business during the life of the car, DON'T BUY IT.

The most rigid investigation will convince you of the stability and permanency of the Kissel Motor Car Company.

Records of KisselKars in economical service up to 100,000 miles—and more—is the best proof of Kissel standards of construction.

The new KisselKar models—the 36-Four at

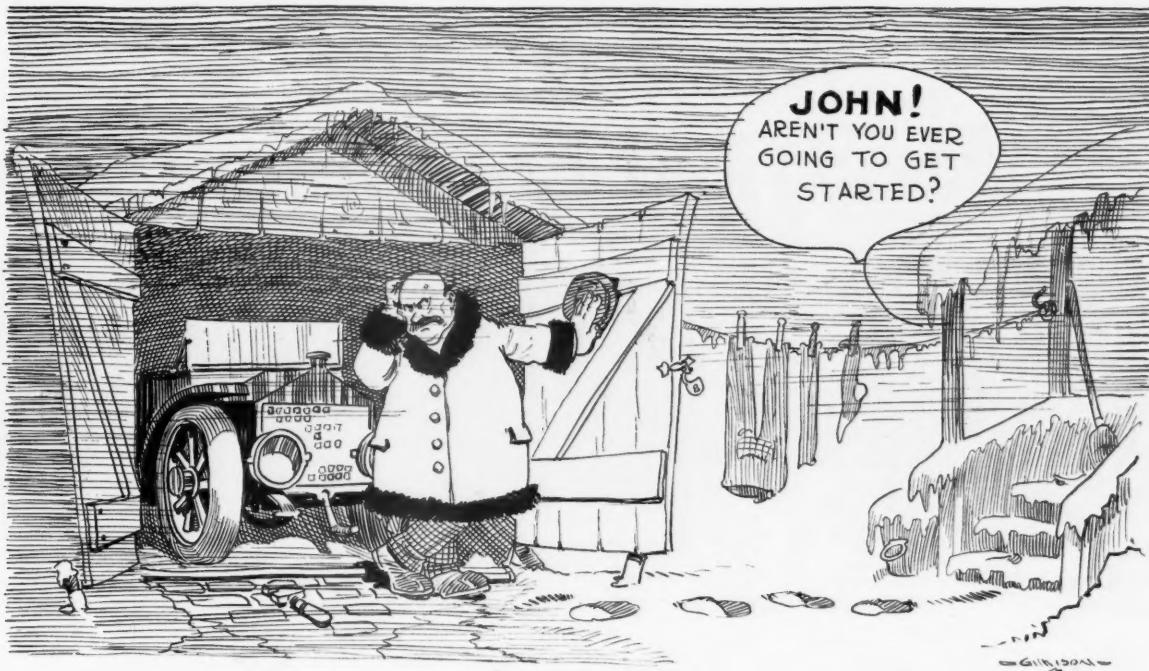
\$1450 and the 42-Six at \$1650 are squarely up to the established KisselKar standards—handsome, able and enduring automobiles. The more you know of these cars the greater your appreciation of their unusual value. For the quality they are wonderfully low priced. See for yourself.

You can rely upon a KisselKar dealer
Let us give you the name of the one nearest you

Kissel Motor Car Company, 121 Kissel Ave., Hartford, Wis.

New York, Boston, Chicago, Philadelphia, St. Louis, Milwaukee, Minneapolis, St. Paul, Dallas, San Francisco, Los Angeles, Oakland, Omaha, Cleveland, Detroit, Toledo, Columbus, Buffalo, Rochester, Baltimore, Pittsburgh, Worcester, Duluth, Seattle, New Orleans, Nashville, Hartford, Conn.; New Haven, Troy, Norfolk, Providence, Marshalltown, Ia.; Madison, Toronto, Calgary, Victoria and 300 other principal points in the United States and Canada.

When Writing to Advertisers, Please Mention Motor Age.



In the Cold Gray Dawn

6° below zero, a dead battery and the 7:50 train just pulled out!

It's a case of the trolley clear into town, or crank your head off for 20 minutes, if you get to the office today.

And all because of a little cold weather. Funny, isn't it — how some batteries need a woolen sweater and ear-lugs to keep on the go?

But it's different with a Willard — a warm heart means good circulation. That's why 85% of American makers of electrically equipped cars depend on Willard batteries for all kinds of weather.



Willard Storage Battery Company Cleveland, Ohio

New York Branch: 228-230 W. 58th St.
Chicago Branch: 2524-30 S. Wabash Ave.

Detroit Branch: 736-38-40 Woodward Ave.

San Francisco Branch: 821 Monadnock Bldg.

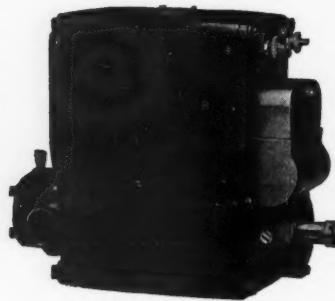
Indianapolis Branch: 318 North Illinois Street

Service Stations in All Principal Cities in the United States, Canada and Mexico

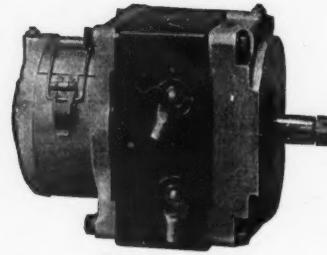
Westinghouse Electrical Equipment



Ignition and Lighting Generator



Lighting Generator



Starting Motor

Ignition

Lighting

Starting

Successful car operation depends largely upon the Ignition, Lighting and Starting System.

The builder does not select an electrical system for his car until careful investigation has satisfied him that it is absolutely dependable and efficient. You can safely rely upon the judgment of these builders whose cars have Westinghouse Electrical Equipment.

*Allen
American La France
Amplex
Atterbury
Auburn
Austin
Briggs-Detroiter*

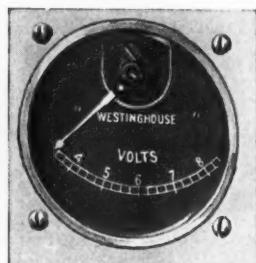
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Crawford
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Dorris
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Glide*

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Lexington-Howard*

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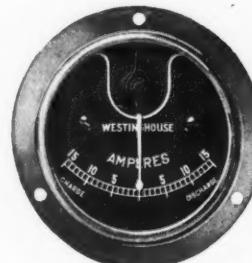
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Speedwell
Standard
Stewart
Vulcan*



Voltmeter on Metal Dash

Westinghouse Meters

should form part of the car equipment to show the condition of the battery at all times. Westinghouse Meters are not toys, they are thoroughly reliable and accurate, constructed with the same care as our larger switchboard meters. They are designed particularly for automobile service. The vibration of the car does not interfere with the reading.



Ammeter

Westinghouse Electric & Manufacturing Co.

Automobile Equipment
Department



East Pittsburgh,
Pennsylvania

PAIGE

More Than a Half Million Dollars Worth of Paiges Sold at the Chicago Show

Another Record That Proves the Supreme Position of the Paige

At the Chicago Automobile Show the Paige, with the astounding total of more than a half million dollars of sales broke its own record and established a new one. The best previous record was made at the New York Show—also by the Paige—51 actual retail sales. It isn't necessary to tell any motor car dealer the meaning of these two unequaled triumphs—Top Place at the two Biggest Shows.

At both the New York and Chicago Shows the Paige "Six-46" at \$1395 easily dominated the whole field of "Sixes"—regardless of price.

At both the New York and Chicago Shows the Paige Glenwood "Four-36" at the extraordinary new price—\$1075—easily dominated the field of the medium-price "Fours." And the Shows are just the beginning of the Selling Season. It means the Biggest Year for Paige Dealers in Paige history. Every Motor Car Show this winter will repeat the story of Paige Supremacy—as New York and Chicago have blazed the trail.

The explanation lies just here. The Shows give the public a chance to compare Paige cars with ALL OTHER CARS. That is all we ask you and the motoring public to do.

Compare

The Paige "Six-46," its seven-passenger comfort, its Paige-Continental motor, its Cantilever spring suspension, Bosch magneto, Gray & Davis lighting and starting system, one-man top and unequaled beauty of design—and its price—\$1395—with any other "Six"—in the world.

Compare

The Glenwood "Four-36," its unit-power plant, its Gray & Davis lighting and starting system, its Bosch magneto, its silent chain, its multiple disc cork-insert clutch, its power, comfort and beauty—and new price—\$1075—with any other "Four" in the world.

Watch the Paige at ALL the Shows

Paige-Detroit Motor Car Co., Detroit, Mich.



SCRIPPS-BOOTH 1915

Scripps-Booth and Luxury

SCRIPPS-BOOTH cars begin a new epoch of motor car building. They announce a new type of motor vehicle, with greater comfort and luxury, more beauty, and easier handiness than has previously been produced in any car in any weight or at any price.

The SCRIPPS-BOOTH is the dream of the exacting buyer and connoisseur realized. It has all the luxurious and up-to-the-minute refinements embodied in cars selling for six times as much. On the road, it shows stamina and efficiency equal to that of automobiles costing \$5,000.

The SCRIPPS-BOOTH is a \$5,000 car for \$775 minus the unwieldy weight that adds to the maintenance expense and physical discomforts.

SCRIPPS-BOOTH CO., Detroit, Mich.



CAMPBELL GUARANTEED MOTOR CAR ACCESSORIES

New Luxury for Owners
New Profits for
Progressive
Dealers



Look for
the name
"Campbell"
on the
buttons

Detachable Upholstery For the New Hupmobile

This latest Campbell accessory has made a "hit" everywhere. Its beauty and richness, its ease of attaching and detaching, its variety of colors and patterns have made it the fastest selling specialty ever introduced. Owners and dealers alike are enthusiastic over Campbell Detachable Upholstery. It is fade proof, shrink proof, dust proof, and its faultless fit and wonderful durability will be a revelation to you. Made in stock sizes in a wide range of colors, patterns and prices to fit all the popular makes and models of cars. Send us the make and model of the car you are interested in, and we will quote you prices and send samples.

One-Man-One-Hand Top

For Light Cars



and ten-second model for Fords. Write for folder.

Ford Fan Belt and Six Other Top-Notch Ford Specialties

Campbell Latigo Ford Fan Belt, the strongest, most durable in the world, 50c; Improved Clutch Throw-out, \$1.00; Foot Accelerator, \$1.50; Windshield Ventilator, \$1.25; New Type Muffler Cut-out, \$1.25; Crank Boots, 20c; Shock Eliminators, \$5.00 per set, front and rear.

Write
for Catalog

Describing in detail all the foregoing accessories and many others.

If you are in the automobile business read this—

We have the fairest, squarest dealer plan you ever read. Every article we sell is backed by our guarantee. Every agent on our books receives co-operation and service that for thirty-five years has been a by-word in the business world.

Accessory dealers, garage men, paint shops, and car agents, write us today. There is money in it for you.

Get This Book

Owners and dealers, both, write for our new 1915 catalog, containing the finest line of automobile accessories ever offered to the buying public. The book is free. Write for it today.



THE PERKINS-CAMPBELL CO.
624 Broadway, Cincinnati, Ohio

CAMPBELL
ESTABLISHED 1879
makes sure you're satisfied

DODGE BROTHERS MOTOR CAR

The moment your foot touches the accelerator you begin to realize that not even the unusual specifications have given you an adequate idea how good the car really is

Its instantaneous responsiveness—the ease with which it gets under way—the abundance of power—the pronounced gliding sensation—the steadiness at high speed—the freedom from gear-shifting—these are qualities which no list of specifications can reveal

The wheelbase is 110 inches
The price of the car complete is \$785
f. o. b. Detroit

DODGE BROTHERS, DETROIT





NATIONAL
RADIATORS

RADIATOR EFFICIENCY

should be measured in terms of work accomplished.

The radiator which has the largest air capacity will cool most water, and thus it requires less water to do the same work.

THE NATIONAL RADIATOR

is revolutionary in its construction and sets up a new standard of radiator efficiency.

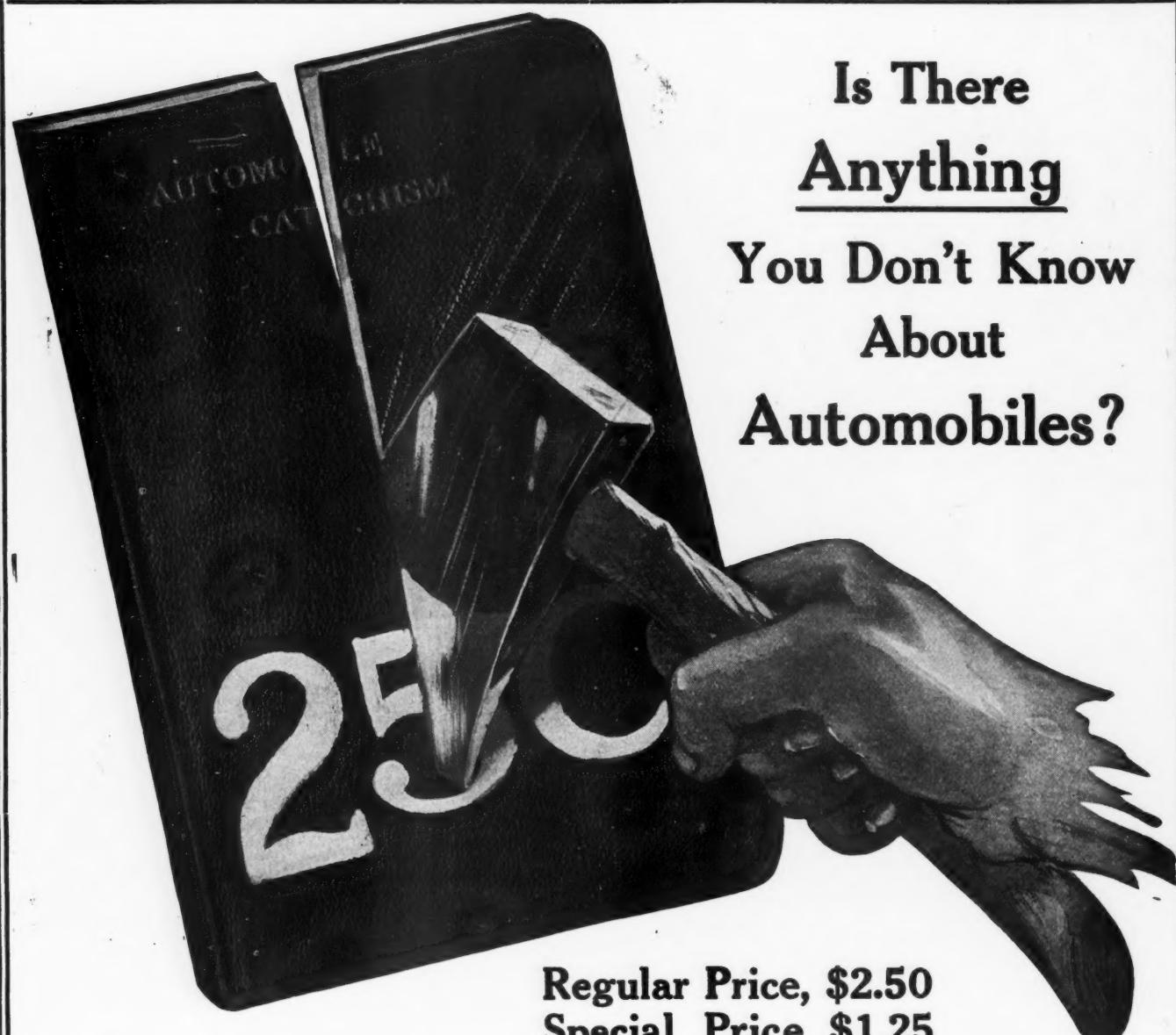
Made of continuous bands of brass in place of the usual individual cells or tubes, it embodies enormous cooling surface with a constructional strength which defies all the shocks and jars of the road.

The continuous corrugated construction cannot pull apart, hence leaky joints are impossible, and the life of the radiator is therefore prolonged indefinitely.

We also specialize on a radiator for FORD cars.

THE NATIONAL CAN COMPANY
DETROIT, MICH.





Is There
Anything
 You Don't Know
 About
 Automobiles?

Regular Price, \$2.50
 Special Price, \$1.25

"THE AUTOMOBILE CATECHISM" (de luxe edition) is a complete course in automobile instruction—every subject discussed and illustrated so that YOU will grasp every point worth while—every bit of mystery is made as simple as A B C. You are interested—you are instructed—you are directly benefited. Its information is final.

It's a handsome piece of book work—splendidly printed, with 101 illustrations; flexible black leather binding, rounded corners and gold-edged pages—beautiful, while being intensely practical.

It will be to your immediate financial advantage to acquire an intimate and practical knowledge of cars and their parts. Lack of knowledge is expensive.

We want every reader of Motor Age to have a de luxe copy of "The Automobile Catechism." To make our offer irresistible we have decided, FOR A LIMITED TIME ONLY, to CUT THE PRICE IN TWO. This half price (\$1.25) will prove the best investment you ever made. Remember, this is the de luxe edition—264 pages—every page full of real, money-interest value.

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 Enclosed please find \$1.25,
 for which send me a copy of
 "The Automobile Catechism"
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Put your name and address on the corner coupon, tear from the page, enclose \$1.25 and mail today to—

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(2)

NEW DEPARTURE BALL BEARINGS

American Made for American Trade



BUILT of the best materials that the world affords, under methods and processes advanced to the highest degree of precision.

No consideration of the cost of production is permitted to interfere with making perfect every component part of each of the four types of New Departures, whether pertaining to design, workmanship, finish or inspection.

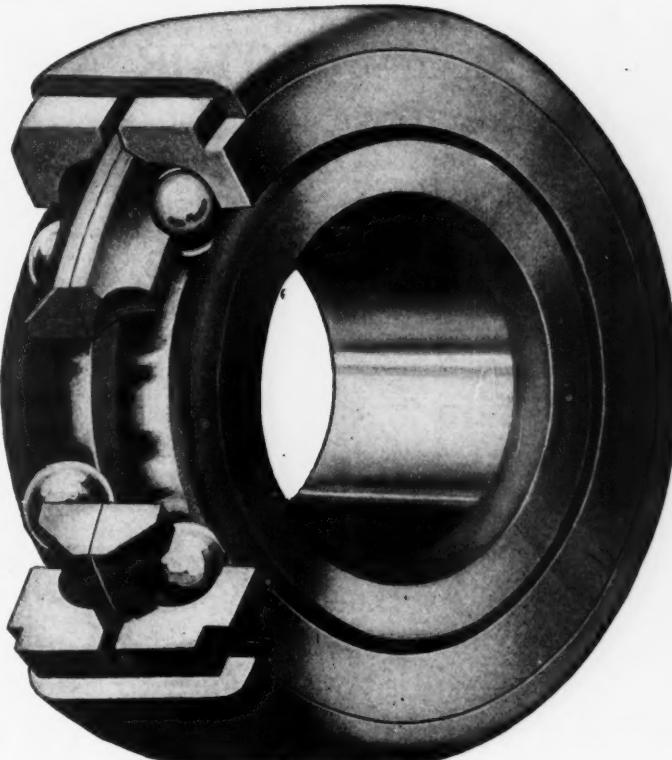
It has been conclusively demonstrated that New Departure Ball Bearings, each according to its purpose and capacity, will yield the highest possible satisfaction in anti-friction bearing service.

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The New Departure Mfg. Co.
Bristol, Conn., U. S. A.

Distributors in Trade Centers Throughout the
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Western Branch: 1016-17 Ford Bldg., Detroit, Mich.



MAKE \$250⁰⁰ MONTH REPAIRING A MONTH AUTOMOBILE TIRES

Sounds like a lot of money—IT IS—A WHOLE LOT of MONEY to be earning CLEAR every month—yet it's what hundreds of men we have established in the Automobile Tire Repair Business are making. You let down the DRAW BRIDGE for SUCCESS to enter into your career by getting into business for yourself. The business for you is the one where investment is small—the returns quick and for cash—where the margin of profit is large—the demand for your PRODUCT or SERVICE constant and ever on the increase.

A Haywood Tire Repair Equipment

tainty of success in this business is as sure as anything in this world can be—Each year adds thousands of new Automobile Owners—they need YOU to keep their tires in service.

Here Is Your Opportunity!

Be first to enter this new, big paying business in your town. Open your pockets. Let the dollars pour in. Act quick. Every auto sold means more tires to mend. Automobile business is growing fast—enormous field for tire repairing. Punctures and blowouts are common. Tires need retreading and vulcanizing. Something going wrong all the time. Thousands forced to buy new tires because they can't get old ones fixed. Think of the old bicycle days—repair shops on every corner—all making money—busy day and night. Autos make same proposition over again—only ten times bigger and better. Users of Haywood Tire Repair Plants are making big money. Johnston, Tex., writes: "I have made as high as \$18 in a day." Another man who bought a plant September, 1911, writes he has cleared over \$3000.00. That's going some! Operate a plant as a side line in connection with auto business—garage or as an independent business. Find neighborhood where there's a bunch of autos—get all the steady business besides transient work. Experience unnecessary. You learn quick. Simply follow directions—practice a few days on a couple of old tires and you'll be ready to coin money. Business comes fast and easy.

HAYWOOD TIRE & EQUIPMENT COMPANY

Repair Tires At Home

Young men! and boys repair father's tires—get money he pays garage man. Get the neighbor's work. Make money to attend college or to start a garage and repair business. Auto owners—repair your own tires—save money—pay for your outfit in short time. We have outfits for home use. Anyhow, investigate. Send today for catalogue. See the wonderful possibilities in this marvelous field. Learn of the enormous money-making opportunities in this fascinating new business.

720 N. Capitol Avenue, INDIANAPOLIS, INDIANA. *The New Money-Making Business—Start Now*



"I can't get MOTOR AGE on the news-stands. For the enclosed 10c. please send me a copy of the _____ number."

We can't help it if the news-dealer didn't order enough to supply everybody.

He isn't to blame if he buys only enough to fill his orders.

You can't expect the demand to be exactly the same at all news-stands all the time.

If you don't order ahead at the news-stands you're likely to be disappointed often. A subscription for the year at \$3.00 is disappointment insurance.

Your news-dealer will take your subscription or we will if you'll mail it to

MOTOR AGE
1004 Karpen Building, CHICAGO



Bosch Magneto are made as well as expert workmen with the best of machines and best of raw materials can make. Because of this the Bosch Magneto is known as the most desirable ignition system.

By reason of its quality the Bosch Magneto may cost a trifle more than other ignition systems—but, considering its ability to serve long and well and to give efficient service irrespective of the knowledge or attention of the user, it is comparatively the cheapest ignition system made.

No car is too low priced to satisfy—to satisfy it must be Bosch-Equipt

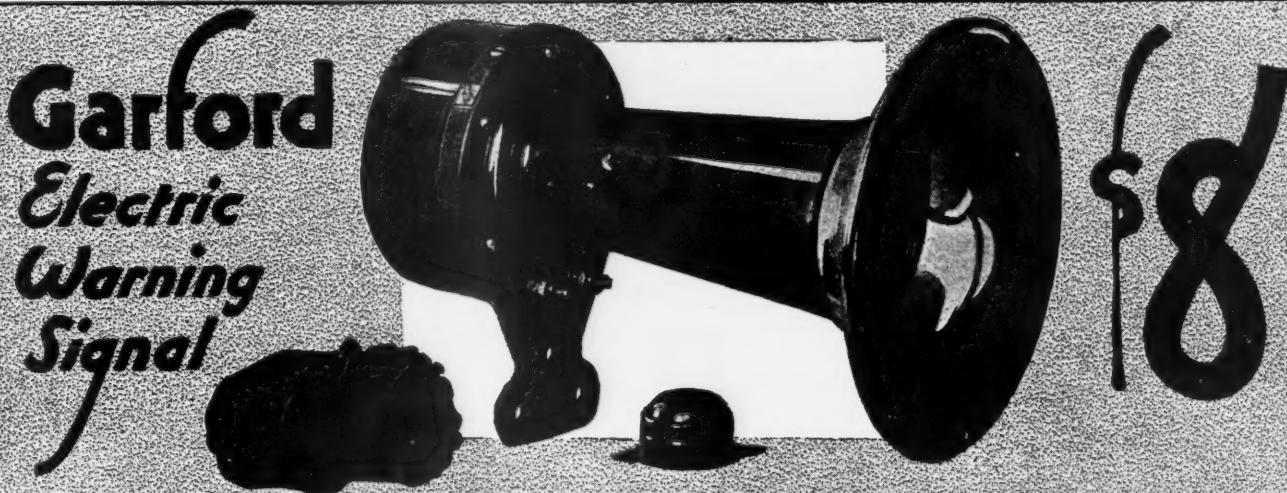
Correspondence Invited

BOSCH MAGNETO CO., 214 West 46th Street, New York

Chicago—Detroit

Over 250 Service Stations

San Francisco—Toronto



New, Improved Electric Warning Signal

Easiest operated. Convenient new style, extra large push button insures instant contact from any angle. Gives sharp, decisive warning.

Uses dry cells or storage battery.

It's guaranteed. The GARFORD \$4.25 Hand Warning Signal leads its class.

DEALERS—GARFORD sales pay. Write

The Garford Manufacturing Company,

2503 Olive Street
ELYRIA, OHIO

BRANCH—The Garford Mfg. Co., Kansas City, Mo.
DISTRIBUTORS—Dean Electric Co., Seattle, Wash.; Dean Electric Co., Los Angeles, Cal.; Sumter Telephone Supply Co., Sumter, S. C.

Make Money Repairing Tires

Every day adds to the possibility of greater income in the business of repairing tires. Every automobile sold means more tires to repair. Nearly two million cars in use now and the need of practical tire repair men is far short of the demand. Get in the business.

Big Profit on Every Repair Job

Punctures and blow-outs are common, tires need vulcanizing and retreading. There is a profit, a big profit on every job. Don't make a fatal mistake, however, and get the wrong outfit for your shop. To do good work, you need a first class Tire Repair Outfit. Don't buy any other than the patented.

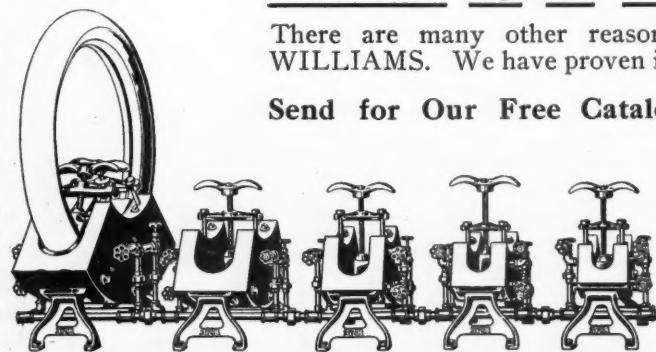
Akron-Williams Tire Repairing Outfit

This is the standard. It has stood the test of time. Your success will be measured by the quality of your work; you are certain of that when you buy an AKRON-WILLIAMS OUTFIT. Is it the one you want? Surely! Here is proof.

Endorsed by 30 Leading Tire Manufacturers

There are many other reasons why you should buy THE AKRON-WILLIAMS. We have proven it to others; we can prove it to you, if you will

Send for Our Free Catalog No. 200. It Gives You Details.



The Williams Foundry and Machine Company

Ash and Canal Sts., Akron, Ohio

THE WATERHOUSE & LESTER CO.
SAN FRANCISCO AND LOS ANGELES
Exclusive California Distributors



If You are the Best Tire Dealer in Your Town You Should Get the Best Tire Proposition—the Exclusive Sale of

Miller GEARED TO THE ROAD Tires

THE Miller Plan of selling tires is the best for you, Mr. Dealer, because it gives you the most "real, not paper" profit. The Miller Method of building tires insures greater mileage, service and satisfaction to the motorist—this means permanent customers. The *exclusive* sale of Miller tires gives you all the profit from every Miller tire sold in your territory.

Miller tires have always been easy to sell, but this year a big national advertising campaign will make them the easiest selling tire made. All the force of this big 1915 national* advertising campaign works for you—because motorists in your town can buy their Miller tires *only from you*.

Your letter will receive the personal attention of Miller executives, who will give you the details of the Miller Plan. Write at once before some other dealer gets the exclusive sale of Miller Tires in your town.

THE MILLER RUBBER CO., Akron, Ohio
Distributors in the Principal Cities

*See Saturday Evening Post on February 25th.

When Writing to Advertisers, Please Mention Motor Age.

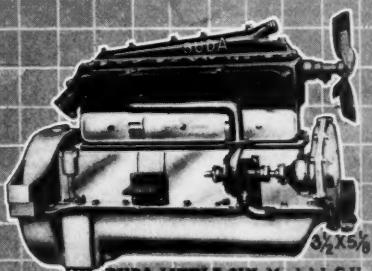




Ask Any User About

GABRIEL SNUBBERS

Gabriel Horn Mfg. Co., 1415 E. 40th St., Cleveland, Ohio



BUDA LITTLE SIX, Model LSU.

"Just a line to tell you" why the latest

BUDA
MOTOR

is "The Part That Sells The Car"

PROOF NOT ASSERTION

The black line is the remarkable "horsepower curve" one of the latest Budas, model LSU.

It may not look so wonderful to the untechnical reader as it does to an engineer. But compare it with the gray line which runs below it. The Buda line shows a steady increase of horsepower with increase of speed, clear up to 2000 revolutions per minute, which means

EXTRAORDINARY efficiency and economy, while the gray curve which represents the comparative efficiency of the usual motor begins to fall off much sooner. There's a big story in this line.

It tells of the perfection of the Buda manufacturing process which stands unequalled in its field from start to finish. It means positive saving in gasoline, repairs and nerves.

The latest Buda design speaks for itself as to beauty, accessibility and compactness. Look at it. Then write us for particulars.

THE BUDA COMPANY, HARVEY, ILLINOIS (Chicago Suburb)

Address BRANDENBURG & CO. Fact'y Reps., 1108 S. Mich. Av., Chicago; 57th & B'way, N. Y. C.; Dime Bk. Bldg., Detroit.

REVOLUTIONS PER MINUTE
1000 1500

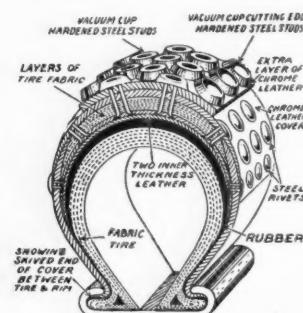
When Writing to Advertisers, Please Mention Motor Age.

**10,000 MILES
GUARANTEE BACKS THIS TIRE**



Try Them at Our Expense

TRY Brictson Pneumatic Tires at our expense. Don't pay until you are satisfied. At our risk find out for yourself what wonderful service Brictson Tires give—how resilient and easy riding they are. Get rid of punctures, blowouts and rim cuts. Brictson Tires are rut proof, oil proof and gasoline proof. They are sold under a specific 10,000-mile written service guarantee.



Your Tires Rebuilt the Brixtson Way

If the fabric in the tires you are now using is in good condition, we can take them, make them proof against rim-cutting, punctures, blowouts, side wall breaks, skidding, ruts, oil, and give thousands of miles additional service.

Sign and send back coupon for full information and details of our liberal Free Trial Plan

THE BRICSTON MFG. COMPANY
1225 Brixtson Building

Mail Back This Coupon

Brixtson Mfg. Co., 1225 Brixtson Bldg., Brookings, So. Dak.
Please send me full particulars about Brixtson Tires, explain your free trial plan, also explain how my own tires can be rebuilt the Brixtson Way.

Size of Tires _____

Name _____

Address _____



ROOFS

—put on last but rather important for all that!

IMAGINE building an expensive residence—or even a \$3,000 or \$4,000 cottage, with all the conveniences of a modern home—and then slapping on a poorly constructed roof—the kind that leaks like a sieve after a month or two.

And yet hundreds of motor car owners will pay as much for a touring car as for a fair size house, carefully examining engine, carburetor, magneto, and tires, and then let the dealer "include" any kind of a "roof."

Just as in the case of a house roof, an automobile Top looks all right when it's new. But in service the difference begins to show right away.

The cheap Top gets dirty and spotted; oil and dust get ground into the fabric; the Top material cracks and breaks under the strain of raising and lowering; and it needs but a few changes in the weather, to take out all the Top's resisting powers.

There is one protection for the car owner—

genuine

Pantasote

Pantasote has been made by the Pantasote Company for over twenty years.

It is guaranteed with a guarantee direct from the maker to owner.

It is specially constructed to withstand the weather hardships that the "roof" is put to. Like all good roof materials Pantasote costs a little more than inferior substitutes, and is therefore side-stepped by the dealer or car manufacturer who is looking for the last dollar of profit rather than for the last ounce of satisfaction-to-the-owner.

Genuine Pantasote is labeled. You can identify it and easily distinguish it from the hosts of imitations that are flooding the market. The cheap substitutes for Pantasote find a ready sale among the buyers of motor cars who think of the "roof" only after it has proved itself totally inadequate to give even half-way protection.

Think about your Top BEFORE you buy your car—like a house roof, it goes on last, but if it is weak and flimsy it will wear out first.

Specify Pantasote and see that you GET it.



CAUTION—In purchasing an automobile Top look for this label. It's your safest protection. There are cheap surface coated Top materials which look like Pantasote (but only when they are new). Substitution is frequently practiced by unscrupulous dealers to increase their profits at the purchaser's expense. Labels like this are sent out free with every shipment of Pantasote. The Top maker has no excuse for not using them on Pantasote Tops.

"What's What in Top Materials" is a 24-page treatise on the general subject of Top materials. It is sent without charge on request and gives you an insight into the Top material question which DOES NOT SHOW ON THE SURFACE.

Every Top looks well when it's new—there are a number of reasons why Pantasote keeps looking new after it has actually been "on the road." Send for this booklet today.

The Pantasote Company
61 Bowling Green Bldg., New York, N.Y.

**Said a Clubman at The Auto Show**

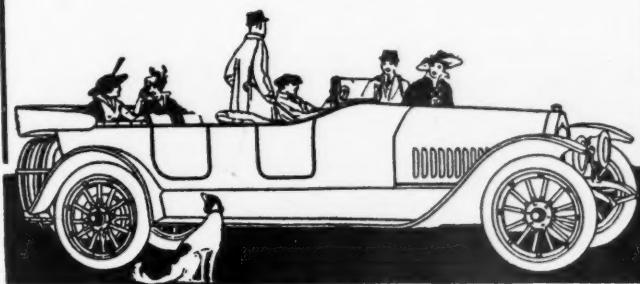
"I wanted a car of power, speed and get-ahead-and-stay-there, so I got a *National*, Stock Car Champion and America's International 500-Mile race record holder." Said a Society Woman, "I wanted a car of extreme luxury, comfort, convenience, ease of riding, and perfect appointments, so I got a *National*."

Said the man to whom price is of no consequence—"I wanted the very latest in design, both machinery and body styles, so I bought a *National*."

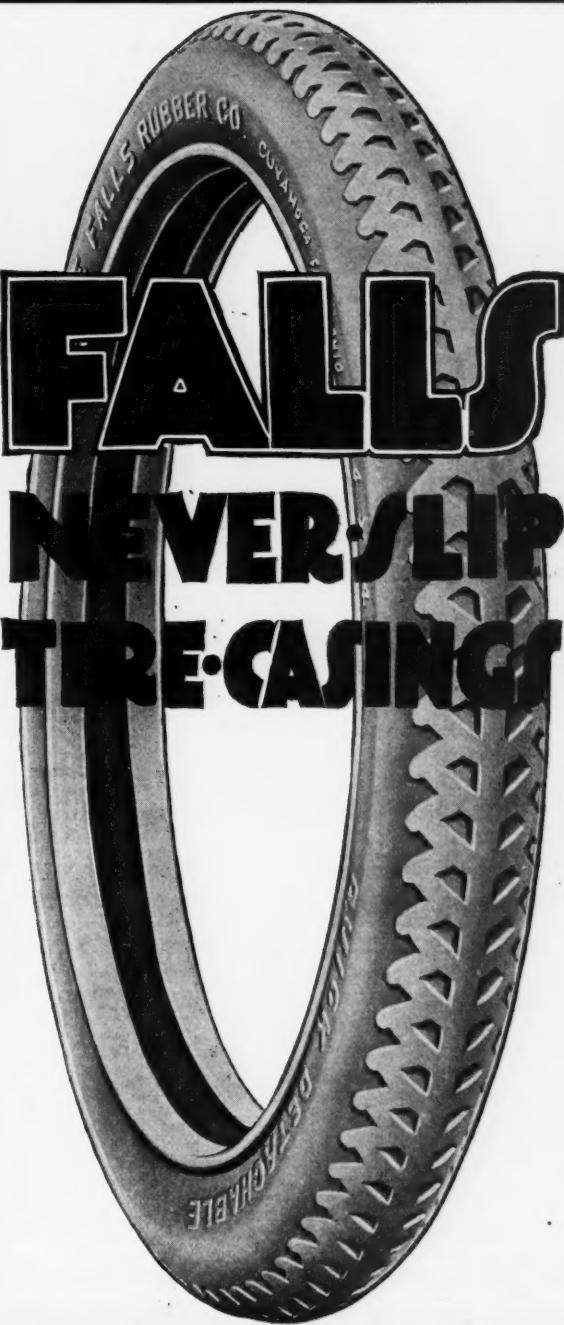
And said the man who knows nothing about machinery: "I wanted a car that would perform so faithfully that I could forget it had machinery operating inside it. So I bought a *National*. Visit the *National* exhibit at the Auto show and you will find your reason in the *National*."

National Carsales are breaking all records this season—and on top of a 45% increase in 1914. There's absolutely no question about Nationals selling better than ever the only question is: "Are you going to be the dealer who profits by the National's fame and success?"

National Motor Vehicle Co.
Indianapolis



When Writing to Advertisers, Please Mention Motor Age.



They Stop the Skid Before It Starts

They "Stand the Run." Protect your pocket-book, your car and yourself by demanding "FALLS" next time.

THE FALLS RUBBER CO.
CUYAHOGA FALLS OHIO

EASTERN DISTRIBUTORS. The Falls Tire Co., 633 N. Broad St., Philadelphia, Pa.—Royal Tire Co., 833 7th Ave., New York City, N. Y.

WESTERN DISTRIBUTORS. Prigge Bros., 1344 S. Michigan Ave., Chicago—The Denver Rubber Co., 516 16th St., Denver, Colo.—Naegle & Lamb Co., 1204 Hennepin Ave., Minneapolis, Minn.

"Eklips"

A Spark Plug of Many Merits



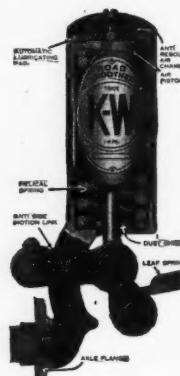
None better on the market in appearance or point of service. Car owners should give it a trial. Absolutely first class materials, including hand-turned, imported porcelain, strong clean-cut threads, soot-proof and oil-proof features, always sparks, finely finished—highly polished nickel.

MADE TO FIT ALL MOTORS

The mica type, preferred by many where heat and oil conditions are particularly bad, is fashioned after a process of our own and will give exceptionally satisfactory service.

Ask any dealer for the "EKLIPS." Sold direct if your dealer does not carry it. Write for folder "A Spark Plug of Many Merits."

The Fulton Company
727-729 National Ave., Milwaukee, Wis.



\$15 Set of Four
One for each wheel

Checking Rebound

is just as vital to your comfort as easing the bound.



Road
Reg. U. S. Pat. Off.
Smothers

Quickly Applied to Your Ford Car

effectively check the rebound of the springs by means of an anti-rebound air chamber with its smooth fitting piston. And this comfort is lasting because, like

all K-W Products, K-W Road Smoothers are built of the best materials, rigidly inspected and guaranteed.

Write for illustrated booklet "TAKING OUT THE BUMPS." It tells you about the strong, helical spring that takes up the shock—the anti-rebound air chamber—and the anti-side-motion links that prevent your car from swaying and rocking.

K-W Road Smoothers are sold by dealers who know the difference, everywhere. If you don't know your nearest dealer, write us.

HEADLIGHTING OUTFITS

THE K-W IGNITION CO.
283½ CHESTER AVE CLEVELAND, OHIO, U.S.A.

SPARK COILS
SPARK PLUGS

WHITNEY



"Whitney" Chains

Made by specialists in the foremost organization for chain design and manufacture in America. Our aim is dependability of service under hardest conditions, and our success in this is shown by the standardization of Whitney Chains by the leading motor truck makers of the country.

THE WHITNEY MFG. CO., Hartford, Conn.

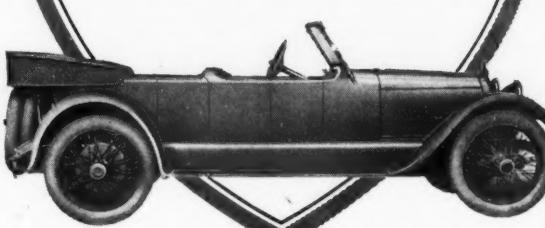
Chains—Keys—Hand Milling Machine

MERCER
22-70 Series

THE marked simplicity, thoroughness in every detail of construction, and the pleasing streamline bodies, are among the reasons for the new Mercer series being pronounced the real sensation of the shows.

Literature Mailed on Request

Mercer Automobile Co.
800 Whitehead Road, Trenton, N. J.



L-A Steady Steerer FOR FORD CARS

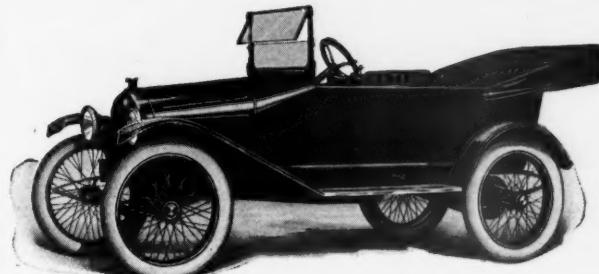
MAKE YOUR FORD WALK the CHALKLINE

Would you give \$2.00 to make your Ford "hold the road" at high speed? To keep your Ford from acting as though it wanted to take to the sidewalk when you turn a corner? To make your Ford steer easy over rough roads? The L-A Steady Steerer completely overcomes these conditions. It is a small, inconspicuous strut or radius rod, connected between the body and axle in such a way as to eliminate all body side-sway—the cause of the trouble. If the L-A Steady Steerer is not obtainable at your dealers, send \$2.00 and receive one direct from the factory. Dealers—write for prices at once. Every Ford owner is a sure buyer.

LOCKWOOD-ASH MOTOR COMPANY
502 Horton Street, Jackson, Michigan



**L-A
STEADY STEERER**



METZ '25'

The Quality Car

**\$600 Equipped Complete
INCLUDING**

**Gray & Davis Electric Starter
and Electric Lights**

This new Metz Touring Model is a man's car, every inch of it; but it pleases the ladies, too. It has the impressive style and the luxurious finish which they so much admire, and is so simple in operation that they can safely drive it.

In addition to electric system, equipment includes rain-vision wind shield, instant one-man top, heavy tufted upholstery, deep cushions, 32" wheels, 3½" Goodrich clincher tires, Bosch magneto, Hyatt roller bearings, built-in gasoline gauge, speedometer, signal horn, tools, etc., and fibre grip gearless transmission—which eliminates all clutch and gear trouble.

*We want to hear from Dealers
Write for particulars and New Catalog "K"*

METZ COMPANY, Waltham, Mass.

HERE IT IS!

This Ford Shock Absorber equips your car for better going and longer life.



Pat. Oct. 2nd, 1914

The greatest Shock Absorber ever made, sold at the right price and easily attached by the car owner. These cardinal points make the value:

The four corner bolts keep the spring aligned; whatever way the sway comes, the spring must give a straight pull.

Spring is enclosed dust-, grit- and water-proof in a glove-smooth housing packed with grease.



Pat. Oct. 2, 1914

JUST LOOK AT THE PRICES!

For Ford.....	\$1 per set of four
Cars up to 2600 lbs.....	\$16 per set of two
2700 lbs. and up.....	\$18 per set of two

Dealers, by carrying a small stock of the U. S. Absorbers, together with extra springs, can supply the demand of any weight car at a moment's notice.

MANUFACTURED BY

B. & L. Auto Lamp Co.
507-509 W. 35th St., NEW YORK, N. Y.



**The wise motorist insists
upon magneto equipment
on any car he owns**

**SPLITDORF ELECTRICAL CO.
NEWARK, NEW JERSEY**

*(All SPLITDORF features are fully covered by patent
or patents pending)*

TAKES THE "JUMP AND JERK" OUT OF YOUR ENGINE

FORD OWNERS

The Crowe Master Vibrator produces a quick, hot spark, always uniform—no missing or late sparks; increases the power of your engine, economizes fuel; makes your engine start easier, runs smoother, develops more power. You can go slower on high gear, without danger of killing engine. *Simplest Vibrator.* Only 2-1/2 inches in diameter, neat in appearance & easily installed. Sold under our guarantee of perfect satisfaction or all money refunded. Dealers will find THE CROWE a good seller at a good profit. ALL CROWE users are enthusiastic. If your dealer does not have it, write us.

LISLE MFG. CO. - 140 Main St., Clarinda, Iowa

\$10-Complete

With 12 ft. hose and gauge. MAYO Q. D. Spark Plug \$1.50 extra. MAYO Ford Pump with hose and gauge, \$8.

MAYO PUMP

Pumps pure, fresh air only. Will outlast any car. Gauge prevents over-inflation. Sold on 30 days' free trial.

MAYO MFG. CO.
55 E. 18th St., Chicago

"Bridgeport"

TRADE CO. MARK U.S.A. U.S.A.

TIRE PUMPS

Are easy to use and easy to sell. They are durable and efficient and are widely advertised. The cylinders are of seamless brass tubing which cannot rust. The "Stapley," the "Aeolus," "Windjammer," etc., give lasting satisfaction. Carry them in stock.

Bridgeport Brass Company
P. O. Box A Bridgeport, Conn.

MASTER CARBURETER CORPORATION
Woodward & Hancock Aves., Detroit, Mich.
Pacific Coast States
Master Carburetor Co., Inc., Los Angeles, Cal.

In all my competitions, including my World's Record trials, I use the MASTER Carbureter. Could there be any greater recommendation?

Signed *Bob Burnay*

No Adjustments

EISEMANN

The most simple—the most accessible—the most durable—the most efficient magneto ever produced is the new Type G-4.

The Eisemann Magneto Company
Sales and General Offices,
32-33d St., Brooklyn, N. Y.
New York, N. Y. Indianapolis, Ind. Detroit, Mich.
245 W. 55th St. 514 N. Capitol Ave. 803 Woodward Ave.

For best results use

SEARCHLIGHT

Acetylene Service for Oxy-Acetylene Welding and Cutting.

The purest and dryest form of compressed acetylene, delivered to you in steel cylinders.

Open the valve and gas is ready.

Let us solve your acetylene problems.

WRITE FOR COMPLETE INFORMATION TO

THE SEARCHLIGHT COMPANY
1016 Karpen Building, Chicago, Ill.

MARMON
"The Easiest Riding Car In The World"

41
\$3250
132" Wheelbase

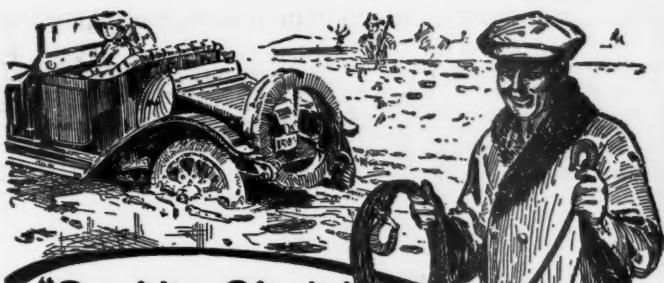
48
\$5000
145" Wheelbase

Nordyke & Marmon Company
Indianapolis (Established 1851) Indiana
"Over Sixty Years of Successful Manufacturing"

THE RUTENBER MOTOR

Low First Cost is not the determining consideration with most of those who buy cars equipped with Rutenber Motors. They can afford to buy the best, regardless of price. But investigation and experience have proved that no car is better than the cars that carry the Rutenber Motor.

THE RUTENBER MOTOR CO.
MARION, INDIANA



"Gee! I'm Glad I Bought This Autowline"

SOONER or later you're going to experience real trouble if you drive without a Basline Autowline along. Punctures, blowouts, engine troubles, holes and ruts are incidents of the road, and when "something happens," you'll need a

Basline Autowline

"The Little Steel Rope With the Big Pull"

to get you home. Why not discount the inevitable? Get a Basline Autowline at once and be ready to tow or be towed. Basline Autowline is about 25 feet long, one-fourth inch in diameter and has hooks and slings for instant attaching. It is finest quality steel wire rope, same as world-famous Yellow Strand Powersteel, and, despite its small size, has enormous pulling power. Price east of Rocky Mountains, is \$3.95. All accessory dealers have it.

FREE A fine illustrated circular telling all about Basline Autowline.



Broderick & Bascom Rope Co.

813 North Second Street, St. Louis, Mo.

New York Office: 76 E. Warren St.
Manufacturers of famous Yellow Strand Power-
steel Wire Rope that helped to build the
Woolworth Bldg., New York.

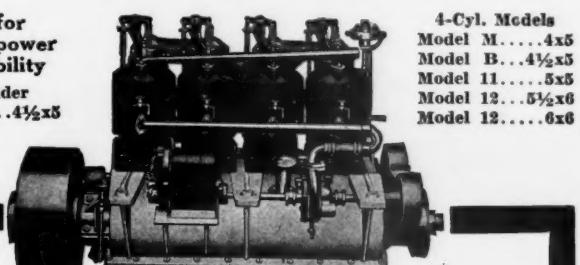
THERE IS MORE POWER IN
THAT GOOD GULF GASOLINE
AND
SUPREME AUTO OIL

MANUFACTURED BY
GULF REFINING COMPANY
PITTSBURGH, PA., U. S. A.

Dealers—Write for our attractive proposition
—Send for our free booklet "Progressive Lubrication".

Famous for
silence, power
and durability

6-Cylinder
Model 6B...4½x5



Successfully used in commercial and
pleasure cars for the past 15 years.

BRENNAN MOTORS

We build a special model adapted to Elmore and White Steam cars.
Write us for detailed specifications.

BRENNAN MOTOR MFG. CO.

Syracuse, New York

When Writing to Advertisers, Please Mention Motor Age.

HERZ PLUG

BOUGIE MERCEDES

GUARANTEED ONE YEAR

DOUBLE STONE Insulation. PLATINUM-ALLOY Electrodes. FOUR SPARKING POINTS. SELF CLEANING. Price, \$1.50. Order from your dealer or

HERZ & CO., 245 W. 55th St. (Nr. Broadway), New York



Let this save
half your tire
expense

It's a Shaler Vulcanizer. It will seal up the small holes in your casing or tube and prevent blow-outs and expensive repairs.

SHALER Vulcanizer

Saves Tires *Saves Repairs*

Will repair any puncture, blow-out, rip, cut, hole or tear in casing or tube perfectly and permanently, and make the repair the strongest part of the tire.

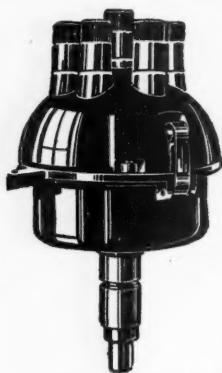
Just fill the hole with new rubber—clamp on the vulcanizer—apply the heat and the repair is completed in a few minutes. It requires no watching or regulating. No need to worry about overcuring or undercuring, because the Shaler has automatic heat control—an exclusive feature.

We make Shaler Vulcanizers in every type—Electric, Steam, Gasoline and Alcohol. Shaler Tube-kit, \$2.00; Shaler Vul-kit (gasoline) at \$3.50; Model D (operates from electric light socket), \$12.50; Model S (steam), \$12.50. Complete Garage Outfit (electric or steam), \$60.

Write for Complete Catalog and free book "Care and Repair of Tires"—the most valuable book about tires ever published.

Every motorist should read it and post himself about his tires—how to care for them and reduce his tire expense. It's free. Send for your copy.

C. A. Shaler Co. 205 Fourth St. Waupun, Wis.



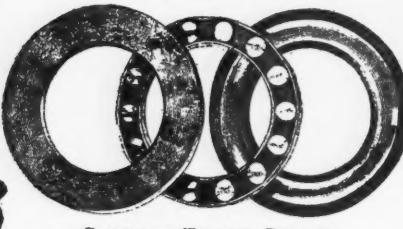
The
**Atwater Kent
Ignition System**

Used on one-quarter of
all the cars at the
New York Show

4934 STENTON AVENUE
PHILADELPHIA, PA.

The Bearings Company of America

Sales Dept.: 250 W. 54th St.
New York



COMPLETE THRUST BEARING

Manufacturers of Radial Ball Retainers, Thrust Ball
Retainers, Complete Thrust Bearings

**Prime Your Engine with
Prest-O-Lite
to start easily**

\$
4

Acetylene priming is indispensable with any
method of starting, ensuring quick and easy
starts in any weather. Saves the mechanism
—saves your arm. The Prest-O-Primer is
easily and quickly attached to any car. Write for details.

The Prest-O-Lite Co., Inc. 233 Speedway
Indianapolis, Ind.

Link your motor to the **BIG BOY**—a big
plug for big deeds. Guaranteed forever,
because it's a—



BIG BOY, all sizes, all dealers.....	\$1.00
Regular, all sizes, all dealers.....	.75
Priming, all sizes, all dealers.....	1.25
Combination, all sizes, all dealers.....	1.25
Platinum Point, all sizes, all dealers.....	1.50

EMIL GROSSMAN MFG. CO., Inc.
Bush Terminal, Model Factory No. 20
Brooklyn (New York City)
Chicago: 2615 Michigan Ave.



See the new enclosed Ford cars

The Coupelet, a luxurious two-passenger car, and
the five-passenger Sedan, a roomy, stylish family
car. Prices of the Ford line; Coupelet \$750, Sedan
\$975, Runabout \$440, Touring Car \$490, Town Car
\$690 f. o. b. Detroit fully equipped.

Ask nearest Ford branch or dealer about Ford
profit-sharing with retail buyers.

Ford Motor Company

Detroit, Mich.

Write
to-day for our
Territorial Agreement
on the

**New \$1000
Inter-State
"FOUR"**

The one popular priced car with
the greatest selling arguments
in the country.

Inter-State Motor Co.
802 W. Willard St.
MUNCIE, IND.

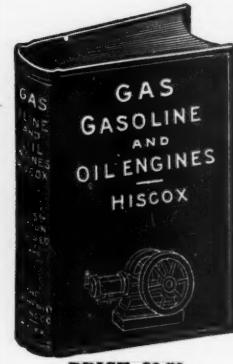
**GAS, GASOLINE
and OIL ENGINES**

Including Gas Producer Plants

By
GARDNER D. HISCOX, M. E.

A complete American book on this
subject for Gas Engine Owners, Gas
Engineers, and intending purchasers
of gas engines, treating fully on the
construction, installation, operation
and maintenance of gas, gasoline,
kerosene and crude petroleum engines.

THE CLASS JOURNAL CO.
910 S. Michigan Ave., Chicago
(33)



PRICE \$2.50
Charges Prepaid

THINK THOUSANDS OF MILES
AHEAD, AND YOU WILL BUY
REPUBLIC MILEAGE
PLAIN AND STAGGARD TREAD
TIRES

THE REPUBLIC RUBBER CO.
YOUNGSTOWN, OHIO.

BRANCHES AND AGENCIES IN THE PRINCIPAL CITIES.

REPUBLIC
RUBBER
CO.

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Polarine

FRICITION REDUCING MOTOR OIL

Maintains the correct lubricating body at any motor speed or heat

STANDARD OIL COMPANY

(AN INDIANA CORPORATION)

Lexington

CRITERION OF ITS CLASS

Thoroughbred Six—\$1875 Famous Four—\$1375
Six Supreme—\$2575

All equipped with the Moore Multiple Exhaust

Write for Details and Co-operative Dealer Proposition

The Lexington-Howard Co. Eighteenth Street West
Connersville, Ind., U. S. A.

CONNECTICUT AUTOMATIC IGNITION



Gives its hottest spark for starting and at low speeds.
Gives a better spark than the magneto at highest attainable speeds.

Investigate—Catalogue on Request
CONNECTICUT TELEPHONE & ELECTRIC CO., Inc.
MERIDEN, CONN.

BRAENDER

Tires & Tubes



Service and Satisfaction

The **only** set of tires to complete the entire 500-mile race at Indianapolis, May 30, 1913. Consider that 88 tires of other makes were changed in this race.

Our "Victory Folder" explains other races.

Established Agents Solicited

BRAENDER RUBBER & TIRE CO.
Main Office & Factory, RUTHERFORD, N. J.
New York, 250 West 54th Street
Agents in principal cities

THE POWERFUL, SILENT SPHINX

\$695

A REAL AUTOMOBILE

The lightest, strongest, most serviceable and economical machine of its kind ever built.
112 inch wheel base. Electrically started and lighted.

Sphinx Motor Car Company, York, Pa.

Electric Auto-Lite

Starting—Lighting—Ignition

Electric Auto-Lite equipment for automobiles is as famous for the service that backs it as for the reliability and economy of its operation.

ELECTRIC AUTO-LITE COMPANY

Home Office and Factory: Toledo, Ohio
New York Detroit Kansas City San Francisco

HOUK

Detachable
WIRE WHEELS

"The wheel that makes any car modern!"

GEORGE W. HOUK COMPANY
1702 Elmwood Avenue, Buffalo, N. Y.

When Writing to Advertisers, Please Mention Motor Age.



Pyrene

FIRE EXTINGUISHERS

A scientific agent which extinguishes every kind of incipient fire—gasoline, and electric, as well as the ordinary kind.

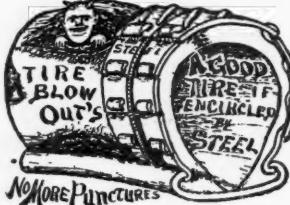
"The Most Efficient Fire Extinguisher Known"

AT LEADING DEALERS EVERYWHERE

Write for Literature

THE PYRENE MFG. CO.
1358 Broadway, New York, N. Y.





Steel Protectors

Each section 2" wide $\frac{1}{8}$ " thick. They hook to rim. As flexible as ever. Anti-skid, can't blow out or rim cut.

HOW CAN THE RUBBER WEAR OFF IF IT IS COVERED WITH STEEL?

Try 2 or 3 sections over any old blowout
Special prices to the first in new territory

Kimball Tire Case Co. 173 Broadway, Council Bluffs, Ia.

Tire covered complete

90% of All Automobile Manufacturers Recommend



As they are not oil dealers they can have but ONE object in recommending it—that of having their cars operate most efficiently and last longest in service. NON-FLUID OIL insures this. No matter what lubricant you now use NON-FLUID OIL will lubricate BETTER and MORE ECONOMICALLY. Try it on your own car and note the improvement.

"K. No. 00 Special" grade for sliding gear transmission
"K. No. 00" for differential, compression cups and all bearings.
Sold by leading dealers everywhere. Look for the orange-colored
cog bearing sprocket-wheel trade-mark shown above

New York & New Jersey Lubricant Co.
165 Broadway, New York 1430 Michigan Ave., Chicago, Ill.

No Garage Can Do Without

the means to determine promptly the exact condition of the electrical equipment of any automobile.

Weston

ELECTRICAL TESTING INSTRUMENTS

are absolutely dependable in locating trouble in starting and lighting systems, or proving its absence. Built to conform in every way with the exacting Weston standard, they are accurate, serviceable, reliable, yet inexpensive. Write for special booklet describing Model 280.

WESTON ELECTRICAL INSTRUMENT CO., NEWARK, N. J.

You can take a thousand miles of service out of a set of tires by driving them insufficiently inflated over ten miles of road.

Use the New Positive Lock Stop TWITCHELL AIR GAUGE

and save your tires



"TIRE INSURANCE FOR \$1.00"

Simple, Accurate, Durable and Easily Read
FOR SALE BY JOBBERS, DEALERS, GARAGES, OR

The Twitchell Gauge Co.
1201 Michigan Avenue CHICAGO, ILLINOIS

SALISBURY

AXLES WHEELS PROPELLERS

 Salisbury Wheel & Mfg. Co. JAMESTOWN NY 

PENNSYLVANIA Oilproof VACUUM CUP TIRES

Making their mark everywhere

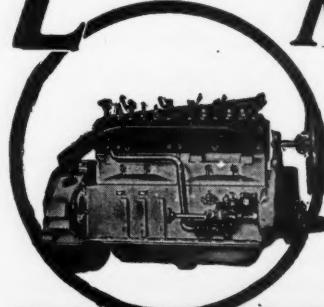
Guaranteed for 4500 miles

**Pennsylvania
Rubber Company**

Jeannette, Pa.



Continental Motors



FOURS	Model U, 2 $\frac{1}{4}$ x 4	Model C, 4 $\frac{1}{4}$ x 5 $\frac{1}{4}$
	Model N, 3 $\frac{1}{2}$ x 5	Model E, 4 $\frac{1}{2}$ x 5 $\frac{1}{4}$
	Model M, 3 $\frac{3}{4}$ x 5	Model T, 5 x 5 $\frac{1}{4}$
SIXES	Model C, 3 $\frac{3}{4}$ x 5 $\frac{1}{4}$	Model T, 5 $\frac{1}{4}$ x 5 $\frac{1}{4}$

SIXES
Model 6-N, 3 $\frac{1}{2}$ x 5
Model 6-P, 3 $\frac{3}{4}$ x 5 $\frac{1}{4}$ Model 6-C, 4 $\frac{1}{2}$ x 5 $\frac{1}{4}$

Continental Motor Mfg. Co.
Detroit, Michigan
Factory Representative, K. F. Peterson,
122 S. Michigan Ave., Chicago

Wisconsin CONSISTENT MOTORS

Dependability

After all it is the motor that keeps on going that makes automobiles and motor trucks a success. Wisconsin Motors, both the auto type and the truck type, have proven that they are

ABSOLUTELY CONSISTENT

You can always rely upon them. You can always be sure that you will keep on going. When you hear one running—and they operate so quietly that it's hard to hear them) you never hear that disagreeable "thump" which accompanies the operation of so many motors—you hear nothing but the rhythmic purr of a perfectly constructed motor.

Complete catalog upon request
WISCONSIN MOTOR MFG. COMPANY
Sta. A-Dept-48. Milwaukee, Wis.



**MORE MILES
- LESS GAS**

Beartone

HORN AND FAN

America's best fan with horn as integral part

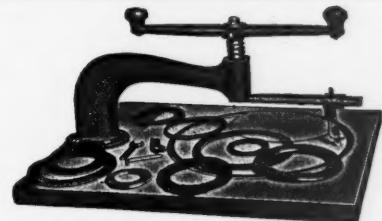
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THE OAKES CO.,  Indianapolis, Ind., U. S. A.

MORE QUALITY for LESS MONEY

*The Horn that
Speaks
For Itself***The Handphone***Three Year Guarantee*Hear and inspect one, compare it with others and judge for yourself. The Most Efficient Hand Horn Made.**Automobile Supply Mfg. Co.** 220 TAAFFE PLACE
BROOKLYN, N. Y.**MODEL MOTORS**
Are Reliable

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2 $\frac{3}{4}$ x 4 $\frac{1}{2}$ "Four" and 3 x 5 "Six"**PITTSBURGH MODEL ENGINE CO.**
Lexington St. and P. R. R. Pittsburgh, Pa.**THE SPRINGFIELD CIRCLE CUTTER***For Cutting**Lamp Glass, Sheet Copper and Rubber
Gaskets, Felt and Fiber Washers, Etc.*Capacity any size circle
from 0 to 14"Positive Measuring Scale
to determine sizesMANUFACTURED BY
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424 Berea Road, Cleveland, Ohio*World's First Maker of Sixes Exclusively*

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CARBURETOR

NO MOVING PARTS
ONLY ONE ADJUSTMENT

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The New Stromberg Carburetors make records for Economy, Power, Acceleration and Smoothness of Running.

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Send us make and model of your car and we'll tell you which new model Stromberg is best adapted for it.

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REGISTERED Weight 45 lbs.
Single Unit
Electric Starting and Lighting System
Famous for Power and Non-Stalling Efficiency. Catalog on Request.
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Full Floating Rear Axle, Platform Rear Spring Suspension, All Recording Instruments in One Unit, Red Electric Flash Oil Gauge, Carburetor Above Frame, 112 Inch Wheel Base, Left Hand Drive, Center One-Lever Control, Multiple Disc Clutch in Oil, Less than 2500 Pounds, 34 H. P. at 1800 R. P. M.
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For War—Recommended by American and Foreign Experts for motor car service.
For Peace—Used all over the United States on cars of all sizes. Comfort and absolute freedom from tire annoyances.
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For All Cars—A tire that is absolutely blow-out proof and puncture-proof.
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Four floating bronze ball valves opening automatically under different motor suction supply a uniform mixture at any speed, regardless of hot, cold, wet or dry weather.
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Made by the oldest manufacturer of carburetors in America
ESTABLISHED 1895
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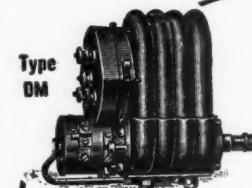
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for the low—the medium and the high priced cars, motor driven & hand operated.

PRICE from \$4.25 to \$15.00

Write for DEALERS' Proposition

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The performance of HEINZE IGNITION APPARATUS for the past ten years justifies our claim that our product is superior in both points of construction and efficiency.

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SALES OFFICES—DETROIT, MICHIGAN
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PREVENTS BLOWOUTS!



It regulates tire pressure, prolongs the life of new tires and insures the old ones. Enables you to carry standard pressure of air in your tires during the hottest day without danger of blowouts.

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It releases the extra pressure caused by expansion from heat or friction. County and state agents wanted everywhere. We want men who can invest \$25 to fit themselves out with nickel plated pressure tank pump and safety valve, to travel and appoint agents in all parts of the U. S. Big and quick money can be made.

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Hyatt Quiet Bearings are used in the majority of American made Automobiles

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*For Second Hand Cars, Surplus Parts, Accessories, Tires,
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ADVERTISING RATES $\frac{1}{2}$ inch—One time, \$2.40. 1 inch—One time, \$4.50. $1\frac{1}{2}$ inches—One time, \$6.75. 2 inches—One time, \$8.75.
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BARGAINS

One Maxwell Special, One Maxwell Mascotte, One Maxwell two-cylinder runabout, One 1914 Overland Speedster. All overhauled and in A1 condition. Address.

BUDA GARAGE, Buda, Ill.

FOR SALE

One 1908 Packard Car

One 1907 Packard Car

One 1908 Packard Car

ALL IN DAILY SERVICE AND IN GOOD CONDITION

A number of De Tamble parts, Model "F" Buick parts, Sterling parts and Overland parts. Some of these are new and some have been used. All of above at sacrifice prices.

Merritt Bros. San Marcos, Texas

FOR SALE

One 1911 Oldsmobile, one 1911 Packard "18," one 1912 Cadillac; all touring cars.

T. K. Hays, Bloomington, Ill.

FOR SALE

Jitney cars; three Studebaker closed cars seating five inside; two extra touring bodies for same; also Studebaker 20 and 30 touring cars, Cadillac and Maxwell touring cars; all in good condition; ideal outfit for jitney service.

The Hesse Motor Car Co., Leavenworth, Kas.

For Sale—Six Ford Taxicabs

nearly new. Have been in service ten months. Will sell one or all of them very reasonable. Address **GLOBE GARAGE, Kalamazoo, Mich.**

For Sale—1914 5-Pass. Allen, Model "40" Electrically equipped. Extra tire and tube. In perfect condition. Run about 3000 miles.

Price \$965

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You will surely find one to fit your requirements. You can get from us good, serviceable machines of various makes for \$400 and up. Let our reputation be your guide.

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Marion, 5-Passenger, Fully Equipped, Torpedo body, electric lighted and up-to-date in every way. Will sacrifice if taken at once.

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These cars are fully equipped. Call or write for further particulars.

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ONE 20 H. P. WHITE STEAMER

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Florida Land in Exchange for Car
Will exchange 10 acres in Palm Beach County, Florida, on Cypress Creek Canal, for a good automobile. Write

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Responsible Distributor Wanted

Manufacturer of wide experience in motor car industry wishes to connect with dealer, distributor or large sales organization able to market high-grade light four-cylinder or interchangeable eight-cylinder car.

Address Box E 286, c/o Motor Age

Small growing company offers good opening for practical machinist who has had experience in ignition production, to take full charge of shop. Must be capable of handling men, and show successful record.

Address Box E 287, c/o Motor Age.

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Best Possible Business Opening

In automobile business. Have been established in same location ten years; garage 110x150, no posts; all up-to-date shop equipment, large storage business; reason for selling, have other business which takes me out of city part of time. We are located in city of over 300,000 inhabitants and have agency for one of the most popular cars on the market, with large territory in most prosperous part of the U. S. Would retain interest with high-grade man if desired. Do not overlook this opportunity; will make appointment at Chicago show if interested. Address Box E 264, c/o Motor Age.

FOR SALE—Garage equipment and small stock. Not much money required. Situated in wealthy community. Rent on building reasonable. Building 45x60. Reason for selling, other business. Address P. O. Box 155, Gibson City, Ill.

For Sale or Lease—The largest and finest equipped garage and salesroom in Nevada. Located on the Lincoln Highway and in the heart of Reno's business district. Will sell building and equipment as a whole or will sell equipment and lease building. Box 635, Reno, Nev.

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Small town, good farming community, investment required about \$1500 cash. Address Box E 277, care Motor Age.

I Have a Fireproof Garage, 60x140 with three thousand dollars' worth of machinery, working five men. It is the best machine shop in a radius of two hundred miles. Will sell or lease it to good, responsible parties on easy terms. Address E. E. Roos, Box 696, Plainview, Tex.

Wanted to Purchase—Interest in Garage having agency for good cars or high grade tires and supplies, including mechanical rubber goods.

Address Box E 285, Motor Age

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30 LINCOLN MILLING MACHINES
\$50 Each
Send for photo and description

LUCAS & SON, 5 Fox St., Bridgeport, Conn.

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All Makes of Magneton and Coils Repaired

Get our prices on re-built ignition systems

PELLET'S MAGNETO EXCHANGE
1606 Michigan Ave., Chicago, Illinois

ALL MAKES OF MAGNETOS
and Coils recharged and repaired. Used Magneton bought, sold and exchanged.
Largest Middle West magneto repair shop.
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**EXPERT REPAIRS MADE ON ALL MAKES
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Also independent high tension magnetos changed to dual for \$10. Mechanics trained by Bosch, and all work guaranteed. General Magneto Repair Co., 236 Halsey St., Newark, N. J.

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Write for Prices Today

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MAILING LISTS AND STATISTICS. Owners or dealers; any state, county, city; weekly and monthly supplements at lowest prices. Special lists of electrics, trucks, Fords, Studebaker, Overland, etc. **MOTOR LIST CO. OF AMERICA**, 1107 Locust St., Des Moines, Iowa.

The Clearing House—continued.

NEW YORK AUTO LISTS. Daily service covering 1915 registrations already started. Send \$10 for first ten thousand and get my proposition on the entire state or one district. Peter Donnelly, Box 9, Capitol Station, Albany, N. Y.

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and addressing requirements to
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1915

Auto Mailing Lists of All Lines For Sale
80,370 Auto Dealers, U. S. \$40.00 or \$2.50 per M
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Have every other Auto Trade list.
All typewritten, showing financial rating.
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Supplied on sheets or cards. Addressing, folding and mailing to auto owners. Special lists promptly compiled, such as Ford owners, dealers, chauffeurs, etc.

New York State Auto Registrations a Specialty
Service the best, rates lower than any.

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That are waterproof, will not stick or peel, weigh 14 ounces, can be carried in pocket. Made to measure. Six colors. Samples material on request.

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Selling out at one-half price the entire stock of the Service Storage Battery Co., 6-60 to 6-150 lighting, ignition and starting batteries.

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Send for special price list of Speedometer Parts.
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ALL SEASON'S RECORDS MADE WITH
Schebler equipment. Why not get a Schebler model R for your car? Our exchange proposition makes it easy.

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We announce a reduction of from \$20.00 to \$14.00 on our Spare Demountable Wheels for the Ford. We have some good territory left. Why not handle an original line? Carry extra wheel with tire on ready and interchangeable with any of present wheels. Can install outfit at home, then change wheels in less than two minutes. Write for catalogue. Legitimate dealers, get our agency for Spare Wheels, Spring Radius Rods, Fan Belts, Radiators, Cradles, etc. "ANGIER'S," Dept. B, Streator, Ill., U. S. A.

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Atlas, Bergdol, Chalmers, Ewing, Alco, Packard, Hudson, Herreshoff, etc. Brown-Lipe Gear Parts, Continental Motor Parts, STA-RITE Rings, \$1.00 each. Regular Piston Rings, 80c each.

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AMERICAN UNDERSLUNG PARTS AND REPAIRS

Exclusive Sales Representatives for Manufacturers who supplied Motors, Axles, Wheels, Transmissions, Steering Columns, Control Levers, etc., to the

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Write for prices on parts needed in connection with American cars.

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These Goods Were Bought from Different Companies at Auction

Michigan 40 bodies, upholstered..	\$100.00
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Selective sliding gear transmissions with clutch.....	60.00
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Spitfire spark plugs.....	.25
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Auto Parts (Any Make) at Cut Prices
First quality piston rings, 25 cents.
Triple piston rings (save expense of cylinder reborning), 90 cents each.

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New and second hand for many makes of cars for sale cheap. Write us when in need of parts.

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Seat covers and body building, remodeling and trimming. Write for prices.

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MICHIGAN, MORA AND DRAGON PARTS IN STOCK

We maintain a complete stock of parts for the above cars.

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AUTO OWNERS

Do you know that a set of
GLOBE SEAT COVERS

on your car will improve the looks 25%, save your clothes and protect the upholstery? Our direct-to-owner plan will save you money. Write for prices and samples of material.

Don't wait—do it now

GLOBE SEAT COVER COMPANY
BOX 75—RACINE, Wis.

AUTO SALVAGE COMPANY

1436 Wabash Ave., Chicago, Ill.
Model K Winton parts, D4 Bosch magneto, \$35. Type 10 Buick parts, Pope-Toledo parts for sale. 9K Stoddard-Dayton motor, \$100. 50 H.P. Royal Tourist motor, \$75.00. Prest-O-Lite tanks, \$9.00 each. DR4 Bosch Magneto, \$35.00. 6-Cyl. dual Bosch Magneto, \$50.00. 35 H.P. Continental motor, \$100. 4 speed sel. trans. with enclosed clutch, \$60.00. 2-Cyl. opposed Davis motor, \$40.00.

BATTERIES
New and used factory prices. Give size and state if for ignition or lighting in first letter. Spark plugs $\frac{1}{2}$ " at \$2.00 a dozen.

The Ampvo Battery Co.
3031 Michigan Ave. Chicago, Ill.

BALL BEARINGS REGROUND

We guarantee them as
GOOD AS NEW

All sizes and makes in stock ready for immediate delivery—AT prices that will interest you.

AHLBERG BEARING CO.
2640 Michigan Ave., Chicago, 1790 Broadway,
New York, 805 Woodward Ave., Detroit, 98
Massachusetts Ave., Boston, 1841 Euclid Ave.,
Cleveland, O. 325 W. Pico St., Los Angeles, Cal.

CHANGE FORD TIRES IN HALF A MINUTE

You owners of Ford cars need worry no more about changing those clincher tires. Detroit's oldest department store is now marketing a new tire tool that will positively take off any clincher tire in 30 seconds, and it will replace it, too, in just that time. Will remove the worst rusted-on tire as easily as a new one. Quicker than demountable rims.

We will send it prepaid for \$1.00, and after two weeks' use if you do not say it is GREAT you may return it, and we will send back your dollar.

HEYN'S BAAZAR
DETROIT MICHIGAN

Croxtown, Michigan, F. A. L., Elmore, Deal, Midland, American, Henderson, Repair Parts Furnished. We also build and repair radiators, cylinders, crank shafts, etc.

Department O
AUTO PARTS COMPANY
737-39 W. Jackson Blvd., Chicago, Ill.

The Clearing House - continued.

Auction

Commencing Wednesday, February 17, 1915, and continuing until sold (which it is expected to take not more than two days), we will sell at public auction the entire plant of the

American Voiturette Company Manufacturers of the famous Keeton and Car-Nations Automobiles Bankrupt, located at Lawton and Buchanan Sts., Detroit, Mich.

We will start the sale promptly at 10 o'clock the first day on the Good Will of the bankrupt concern, said Good Will consisting of the right to use the name, list of car owners, blue prints, etc.

After sale of the Good Will, we will proceed and sell over \$300,000.00 worth of

Machinery, Tools, Standard Parts, Supplies, Accessories, Material, Hardware, Paints, Entire Trimming Shop, etc.

At 2 o'clock Thursday, February 18th, we will offer for sale the Automobiles, of which there are at present 60 7-Passenger and Roadster style "Keetons" and 350 4-Passenger and Roadster style Car-Nations. However, owing to the demand for both the "Keeton" and Car-Nation cars we are unable to state just how many will be on hand at time of sale.

No catalogs of this sale are being issued, and we advise all prospective purchasers to take advantage of the inspection period which starts Saturday, February 13th.

The entire plant will be sold in lots only and not in bulk. Sale will be made for cash. A deposit of 25% is required from each purchaser. No cheques accepted unless certified.

All questions answered at the undersigned auctioneer's office.

Samuel L. Winternitz & Company, Room 506 Rector Building, 79 W. Monroe St., Chicago, Ill.

Please bear in mind that this sale takes place in Detroit.

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5-pass. fore-door, stream line bodies, upholstered and painted, all sizes and styles in stock, \$55.00 to \$85.00.

Model T Ford Delivery Bodies with top and upholstered seat, carrying space 57"x40", clearance under top 54", \$75.00.

Model T Ford Open Dely. body, flare side, boards, upholstered seat, finished, \$50.00.

E. M. F. Fenders, black enamelled—per pair, \$4.50; per set, \$8.00.

Spark Plugs—Each 4 for Fire Fly, $\frac{1}{8}$ -18 size only... \$0.25 \$1.00 Auburn $\frac{1}{2}$ " size only.... .25 1.00

Garage Assortment

1,000 asst. copper gaskets, all the popular sizes in round and flange types \$ 3.00

100 pounds asst. U. S. Std. and S. A. E. cap screws, nuts and bolts, clevis pins, wood screws, etc., etc..... per box 6.00

60 pounds asst. rod ends, spring clips, spring shackle links, adj. yoke ends, plain yoke ends, timer and carburetor levers, clevis pins, etc., etc..... 3.50

Ford Model "T" radiators..... 16.00

High grade cylinder oil, 100 bbls. in the lot, while they last...per gal .16 Sold in barrel lots only, about 50 gal. in bbl.

THE M. & M. COMPANY
480-500 Prospect Ave. Cleveland, O.
Do you want our catalogue? It's yours for the asking.

Cocoons and Carpet Mats, Hand Made Seat Covers, Auto Tops Built and Repaired.
AUTO CAPE TOP CO.
2334 Michigan Ave. Chicago, Ill.

Commercial Bodies

For FORD CARS—14 STYLES

Painted or in Primer

Reduced Prices on flare board and screen panel bodies to fit Poss cars

Motor Truck Bodies and Cab Tops

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CUT PRICES
Send for our illustrated cut price auto supply catalogue.
Liberty Tire & Supply Co.
98 Chambers St. New York, N. Y.

DEALERS WANTED

To handle Parradee's Perfect Tire Preserve, the best tire coating made. Guaranteed to give satisfaction or money refunded; 60c per pint; will coat 12 to 20 tires. Write for discount.

EDWARD PARRADEE
7457 Coles Ave. Chicago, Ill.

F. & H. WIRE WHEELS

Equipped with F. & H. Special Wire Wheel Rims. Adaptable to any car. Complete equipment for Ford cars.

THE F. & H. WIRE WHEEL CO.
Columbus, O.

FORD CAR BODIES

Commercial bodies guaranteed to fit Model "T" Ford. Bucket seats not painted or trimmed, \$5.00 per pair. Trimmed and upholstered backs and cushions, \$15.00 per pair. We also build a full line of Speedster bodies complete; also Ambulance and Undertakers' cars, all for Ford chassis. Send for our catalog. Agents wanted everywhere.

COLUMBIA BODY CO., OF DETROIT
21-23 Seidon Ave. Detroit, Mich.

Ford Connecting Rod Bearings
Of high grade bearing metal, perfect fit guaranteed. Dealers, write for agency proposition.

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3805 6th Ave. Des Moines, Iowa

Ford Cut-outs—Ford cut-outs with brass lock open pedal, complete, \$1.15; with enameled pedal, \$1.00.

Brass Hammers—Polished brass hammer with handle weight 1 lb., price \$0.65

Brass for Bushings—Cored brass for bushings, all sizes. Write for prices.

Lincoln Machine Shops, Lincoln, Ill.

FORD TAXI BODY FOR SALE
Upholstering and other parts good. Price \$125.00. Inquire

E. J. Riley, Attica, Indiana

The Clearing House - continued.

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Racing Seats

You can get complete doors and panels from us at a reasonable price.

GET BUSY AND MODERNIZE YOUR CAR
Write for prices. We have all patterns. We also make racing seats, bodies, radiator covers, etc., etc.

CHICAGO AUTO BODY CO.
1627 Michigan Ave. Chicago, Ill.

Ford Flare Board Bodies

for mounting on rear of roadster body. Sizes 31 wide by 46 in. long, 10 inches high, \$25.00. F. O. B. Detroit. Size 31x60x10, \$28.00 F. O. B. Detroit. Bodies are strong and light, hinged tail gate. Painted black rear lamp bracket and iron furnished, making it quickly interchangeable with turtle back.

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FOR SALE AT A BARGAIN

New 5x6 four-cylinder, governor-controlled engine, fully equipped, with carburetor, magneto. Will sell for much less than cost. **FRED HANSON, 570 Prior Ave., St. Paul, Minn.**

FOR SALE

A small number of modern, well designed and constructed six, five and four-passenger touring bodies and comfortable roadsters painted and trimmed. Will change and guarantee to fit your car. Write us.

IRVIN ROBBINS & CO.
Industrial Building, Tenth and Canal
Indianapolis, Ind.

Guaranteed New Radiators

You need a strong, well built radiator these winter days.

HONEYCOMB RADIATORS	
Ford T.	\$25.00
Hupp	25.00
Buick 10, 24, 25, 34, 35, 36,	27.50
Buick 16, 17, 19, 26, 27,	37.50
Buick 21, 38, 39, 43,	37.50

FIN AND TUBE RADIATORS	
Ford T.	\$20.00
Buick 10	25.00
Buick 24, 25, 34, 35, 36, B24, 25	22.50
Buick 16, 17, 38, 39	31.00
Buick 19, 27, 28, 43	28.00
Buick 21	30.00

Will ship on telegram same day C. O. D.

Detroit Radiator & Specialty Co.
963 Woodward Ave. Detroit, Mich.

GUARANTEED RADIATORS

Not always necessary to buy new radiators. New cores can be furnished for frozen or damaged radiators. We build the fin and tube type. Guaranteed copper fins and tube.

We also repair and furnish new cores for May radiator.

We build new cores for all makes and for all cars. Get our prices. You will save money.

Cores in stock for many standard radiators such as Hupps, Warrens, Herreshoffs, Buicks, E. M. F. 30, Studebaker, Hudson 20, Cadillacs and several others.

We can build and fit a new core in your radiator in two days—if in stock, in one day.

Write for bargain sheet of accessories.

HURON RADIATOR & LAMP CO.
253-255 Jefferson Ave., Detroit, Mich.
Terms cash with the order.

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30x4	7.50	8.50	3.14	4.10	
32x4	8.00	9.00	3.35	4.14	
33x4	9.00	10.00	3.46	4.14	
24x4	9.00	10.00	3.58	4.36	
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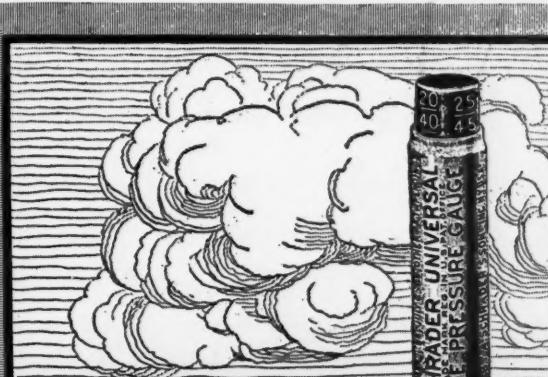
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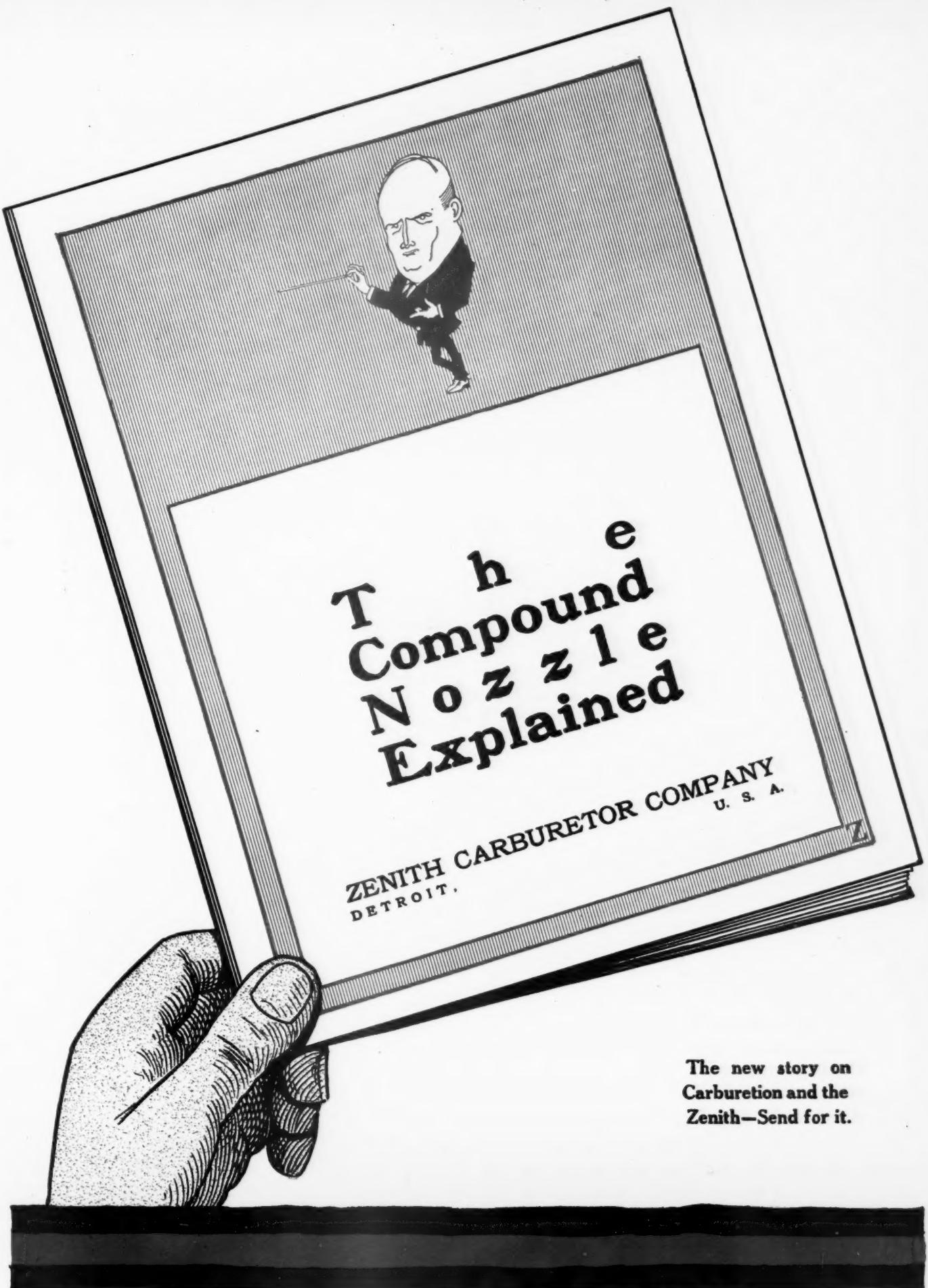
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